THE JOURNAL

OF THE

ROYAL UNITED SERVICE INSTITUTION.

VOL. L. DECEMBER, 1906. No. 346.

[*Authors alone are responsible for the contents of their respective Papers.*]

SECRETARY'S NOTES.

1. The following officers joined the Institution during the month of November :—

Lieutenant R. N. Dick, Royal Sussex Regiment.
Captain W. E. Davies, Rifle Brigade.
Major A. Symons, 13th Hussars.
Lieutenant G. H. S. Furlong, R.N.R.
Lieutenant K. R. Wilson, 22nd Middlesex R.V.
Second Lieutenant B. Stewart, West Kent I.Y.
Lieutenant P. R. Bald, R.E.
Colonel H. G. De Pledge, 19th Hussars.
Major H. J. M. Buist, D.S.O., R.A.M.C.
Commander F. H. Waller, R.N.
Lieutenant E. F. Trew, R.M.L.I.
Captain F. G. Maughan, Durham Light Infantry.
Captain G. Culme-Seymour, K.R.R.C.
Major F. S. Mott, K.R.R.C.
Lieutenant C. P. Grindle, Royal Berkshire Regiment.
Lieutenant B. P. MacMahon, R.N.
Lieutenant J. Harvey, Irish Guards.
Lieutenant C. F. F. Campbell, Scots Guards.
Fleet-Surgeon W. M. Craig, R.N.
Lieutenant A. G. E. Egerton, Coldstream Guards.
Colonel F. Hacket-Thompson, C.B., Commandant Mounted Infantry.
Captain R. A. Gray, Royal Irish Fusiliers.
Major F. G. Cardew, Indian Army.

(No officer of the Militia joined the Institution during the month.)

2. New Presses having been provided for the Admiralty Charts, the collection belonging to the Institution, consisting of about 3,000 in number, has been re-catalogued and re-arranged. The greater number of these charts are up-to-date, and it is hoped to replace the remainder, and also to complete the collection as soon as possible. The Admiralty sailing directions are complete for all parts of the world; tide-tables, nautical almanacs, and similar works are also available. The Council is much

indebted to Commander W. F. Caborne, C.B., for his services in this matter, and also to Rear-Admiral A. M. Field for his kind assistance; both of these gentlemen are members of the Council.

3. The following additions have been made to the Museum :—

(1) A Portrait in Water Colours, of Musician James Gunnis, Royal Marine Band, Portsmouth Division, 1823-1846. This is an interesting portrait, as showing the uniform of the period.
Given by Mr. J. W. Gunnis.

(2) Helmet of the Royal Midlothian Yeomanry Cavalry.
Given by Charles T. Cox, Esq.

(3) Collection of 45 Vernon Medals.
Given by C. P. Wilson, Esq., late Lieutenant Indian Navy.

4. The following vacancies will occur on the Council in March :—

1 Royal Navy.
1 Royal Marines.
1 Regular Army.

5. The following Lectures have been arranged :—

January 16th (Wednesday).—"The Swiss Militia System," by Major R. A. Johnson, 1st V.B. Hampshire Regiment. The Right Honourable R. B. Haldane, K.C., LL.D., M.P., Secretary of State for War, in the Chair.

January 23rd (Wednesday).—"Gun Deafness," by A. H. Cheatle, Esq., F.R.C.S.

January 30th (Wednesday).—"The Blot on Recruit Training," by Lieut.-Colonel F. A. Davy, M.D., late R.A.M.C.

February 6th (Wednesday)—"The *Rôle* of the Red Cross Societies in Peace and War," by Lieut.-Colonel W. G. Macpherson, C.M.G., M.B., R.A.M.C. (Deputy Assistant Director-General).

February 11th (Monday).—"The Organisation of Power Traction on Roads for National Defence," by Colonel the Right Honourable Sir J. H. A. Macdonald, K.C.B. (Honorary Colonel, Army Motor Reserve).

February 20th (Wednesday).—"Education in Relation to the Army," by Sir George Arthur, Bart., late 2nd Life Guards. Major-General Honble. Sir F. W. Stopford, K.C.M.G., C.B., (Commanding the London District), in the Chair.

March 6th (Wednesday).—"The Strategical Value of Speed in Battle-ships," by Julian Corbett, Esq., Naval War Course Lecturer.

On Dates to be Fixed.

"Submarine Telegraphy," by Charles Bright, Esq., F.R.S.E., M.I.E.E.

"Bonaparte's Campaigns in Italy, 1796," by Captain P. A. Charrier, Royal Munster Fusiliers.

THE ORGANISATION OF A MODERN FLEET FOR WAR; CONDUCT IN ACTION, ETC., ETC

FORMER PAPERS (1872, 1880, & 1887) BROUGHT UP TO DATE.

By Rear-Admiral Sir CHARLES CAMPBELL, K.C.M.G., C.B., D.S.O.

Thursday, 24th May, 1906.

Admiral Sir NATHANIEL BOWDEN-SMITH, K.C.B., in the Chair.

INTRODUCTION.

THE 1872 paper was written in competition for the prize offered by the Junior Professional Association, and is quoted to-day as evidence that five-and-thirty years ago I was a strong advocate for "fitting the fleet-ship with a means of defence against torpedoes, supplying her with auxiliary torpedo-boats and a tender in which nothing but speed, turning power, and torpedo fittings have been considered, etc."

The 1880 paper was written in competition for the R.U.S.I. Gold Medal, and further accentuated the necessity for adjuncts and auxiliaries as part of the composition of a fleet.

The 1887 paper had for its object the complete abandonment of masts and sails for propulsion and the systematic organisation of adjuncts and auxiliaries as part of and to accompany future divisions, squadrons, and fleets for the purpose of war. Such portions of these efforts as seem useful have been embodied in this paper for discussion to-day.

The sails have gone for good and all, and only sufficient masts and yards remain temporarily for the purpose of "fire control" and communication by signal. It is therefore needless to dwell on that portion of the 1887 suggestions.

On the other hand, the statement as to "the revolutionary state of things which is going on in everything connected with a floating fight," still holds good, and has been confirmed by a recent experience in Eastern waters. I may therefore repeat "that what was good and proper yesterday is obsolete and condemned to-day, and who knows that to-morrow may not call into existence some new subaqueous or aërial machine which will make it necessary to build ships that will float bottom upwards, or on some other system contrary to the patterns in office."

Since the above words were written, under-water navigation has come to stay, aërial navigation is well above the horizon, and has become one of the possible weapons of future naval warfare; and internal combustion engines are in existence and rapidly growing!

I concluded the paragraph by adding: "Under these circumstances, in regulating the interior economy of present and future divisions, squadrons, and fleets, we must strive our utmost not only to keep pace with the inventions of the day and ahead of all maritime Powers, but to organise and exercise in keeping with adopted inventions, so as to be able to use them with greater effect than any maritime Power; and above all, when anything connected with the fighting capabilities, propulsion, or exercise of the units or their component parts is condemned and proved to be bad, root it out, and have done with it!"

I now suggest that the time has come to substitute telescopic masts with wireless platforms for communication without tops or yards, and so do away entirely with exposed above-deck gun fire. These masts would be telescoped below the armour while within range, their wireless senders, receivers, and platforms coming down and being stowed away beside them in comparative safety.

This decrease or abolition of "above-deck target" would bring your fire control down to the highest level of the deck structure, and you could utilise the weight saved by constructing a fire-control armoured tower in touch with all the guns. It is courting disaster to risk the demolition of your fire control early in the action; some system must be perfected that will give it the best chance of remaining effective until the adversaries' guns have been silenced! The idea of an Eifel Tower structure for fire control and spotting is equally bad on account of exposure, and the same may be said of utilising the boats' cranes.

The one aim and object of all spotting is to get an instantaneous communication from the spotter to the sight setter. It needs little or no demonstration to accentuate the necessity for rapidity! Was the last projectile a hit? How much over or short or to right or left? And how soon can the sight setter know the plunge position?

The unfortunate predicament in which we are placed by the present system is that it requires an elaborate bag of tricks in the shape of conduct wires and instruments which must be placed in the most probable path of the adversaries' projectiles, and whose principal necessity is height above deck.

The enormous risk of destruction at long range leads us to the investigation of other possible methods of obtaining the maximum of efficiency with the minimum risk of early destruction. The problem, put shortly, resolves itself into the following questions and answers:—

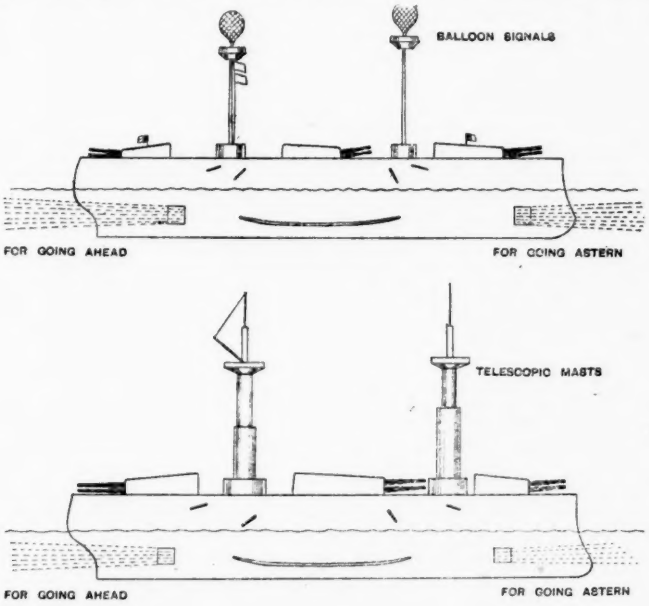
1. Can the sight setter get the elevation required by his own observation at long range? Answer: No.
2. How can he best get the range quickly and its changes continually? Answer: By having independent "squadron spotters" ahead and astern of the adversary, one for each fleet-ship.

The unit scout could perform this duty, keeping her parent informed by prearranged simple ball and cone signal. In addition, each ship should carry two captive balloons to observe the direction and as far as possible spot the elevation. These balloons would also carry halliards for hoisting signals. Free air-ships, when perfected, and capable of accurate navigation, would be most useful in spotting; but by that time, if the "conquest of the air" advances at its present rate, the "water-ship" will have assumed the *rôle* of the *sparrow*, and the "air-ship" that of the *hawk*.

I would also suggest that no boats should be taken into action! They should be hoisted out and sent to the various auxiliaries told off to look after them during action, who would hoist them on to positions specially fitted to receive them.

The boat cranes should be fitted so that after the boats are out they can be lowered into the lowest possible comparative safety position.

I hope and believe that it will be possible before long to do away with the funnels. At present the two most probable solutions of the problem of dispensing with funnels seem to lay between a system of utilising the wasted energies of coal to obtain power, and a system of propulsion without fires, substituting in the latter case explosive force, as already used in motor cars and boats under the name of internal combustion. I do not profess to be able to perfect such explosive engines for large ships; but I have made a rough sketch



Direct Action Internal Combustion

FIG. 1.

(Fig. 1) of what I maintain is wanted, and I make a present of the suggestion to any mechanical genius who has the talent and energy to improve upon it and bring it to perfection.

The effort would be on the same principle as the push of the oar or paddle-wheel, or thrust of the screw, namely, to push water against water, only the action would be direct. We have long had a velocity of 1,700 feet a second in the war rocket by forcing air against air. Surely there are chemical possibilities by which we may attain as

great, if not greater, speed by forcing water against water. Of one thing we may be certain, and that is, that the funnels are quite as sinful to-day as the sails were twenty years ago, and their removal is vitally important. The absence of boilers, funnels, and coal would greatly assist the much-needed reduction of complement in a fleet-ship, both in officers and men, and it would be another instance of the irony of fate if the present controversies on education, rank and position ended in effacement.

Besides the enormous advantage of having your propulsion completely below the water-line, you would be in a position to devise a means by which you could render the ship unsinkable. For instance, each compartment would be connected by pipe and valve with the cylinder sluice-well between the cylinder and the driving aperture, so that the action of the thrust would clear leaky compartments of water. Just consider for one moment the space gained by some such system, which would become available for ammunition and fuel, and the reduction of internal weight caused by the absence of boilers and steam machinery, together with the removal of the funnels as targets for the opponents' shot and shell.

The steering could be accomplished by giving the cylinder and driving tube a lateral motion to the right and left, or possibly by fitting two side propulsors at right angles to the keel. Going astern would present some difficulty, but if no better way could be discovered you could have two smaller bow tubes, one on each bow, which would close automatically on going ahead.

If no one is prepared to work on this suggestion, there are other already existing ways by which internal-combustion engines can be used for propulsion in fleet-ships, as also in passenger and cargo boats, and surely the vast gain both for war and commercial purposes would make it well worth the development of the idea by an inventive genius. In 1887 I was criticised by a talented officer then commanding afloat for treating the turbine engine as an accepted form of propulsion. He stated in the discussion: "At all events, it has not proved itself hitherto a factor on which we can rely, and therefore the lecturer has drawn, to a certain extent, on what he thinks may be possible in the future, rather than what is possible in the present." Now that is what I conceive is the duty of every lecturer who is asked to read a paper on a given subject in this theatre. Study historical retrospect and watch closely the trend of the inventions of home and foreign genius; bring the line up to date, and then endeavour to forecast the direction of future improvement. That, to my mind, spells progress. As you cannot obtain one glimpse of the future except through the medium of a reflected past, study the past; then predict, and act on your predictions. That is the duty of those entrusted with the fearful responsibility for the safety of these little islands and their big dependencies. All I wish to predict to-day is, that "internal-combustion engines," oil, gas, or chemical, will grow in size and number, and will eventually become the motive power for the purposes of commerce and war, and that in the long run, air fleets will be a serious menace to "water fleets," and may eventually replace them. I was just as certain in 1887 that the "turbine" was the engine of the future in large vessels for war or trade as I am to-day that "internal-combustion engines" will gradually be used by ships of ever-increasing tonnage; that masts and funnels must go for good and all; and that aëroplanes and navigable air-ships for war and

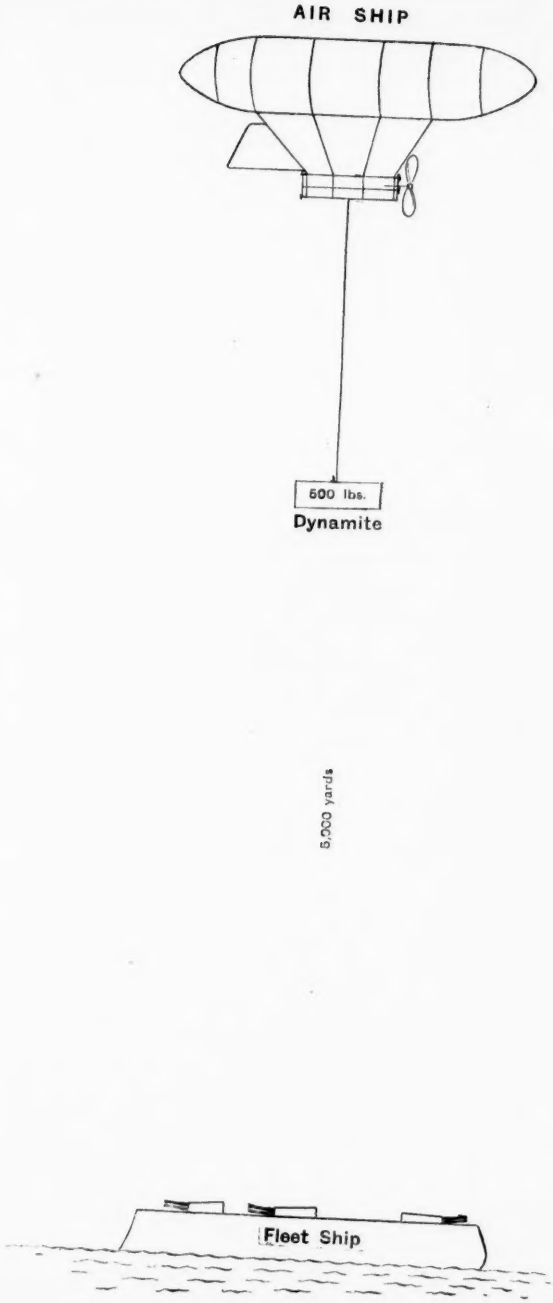


FIG. 2.

travelling are surely attaining a position which entitles them to serious consideration.

In the meantime Mr. Thomas A. Edison threatens us with a system of control of the wasted energies of coal, which he estimates will take a liner across the Atlantic in three days on a tenth of the present expenditure. As the funnels exist for the sole purpose of drawing the wasted energies and discharging them into the air, it follows that if no energy is wasted no funnels are required.

He also supports the practicability of using the aëriel microbe for the wholesale destruction of the "mammoth fleet-ships," and proposes to drop a dynamite shell (Fig. 2) anywhere within a mile or two of, and so pulverise, the hostile vessel.

Surely the "conquest of the air" is a serious menace to "sea power," and we may ere long be discussing the tactics of an air battle!

Fleet-ships.

The question of designing and building "fleet-ships," and, I may say, the question of their existence, has not escaped the universal controversy which eternally surrounds naval problems, and various solutions have been suggested from time to time. Twenty years ago there were not wanting officers and other experts of high repute and sound judgment who argued, with considerable ability and apparently on reliable *data*, that the days of the "fleet-ship" were numbered, and that swift sea-going torpedo craft were capable of making a clean sweep of them.

During the interval, notwithstanding the fact that the underwater "microbe" has continued to develop and has to be seriously considered, in addition to the above-water members of its family, and the gradual development of the air-ship, there is nothing so marked during the last decade, both at home and abroad, as the steady growth of tonnage, speed, and gun power of the "fleet-ship" (mammoth).

For example, in 1887 I quoted the "Dreadnought" as tactically the most powerful "fleet-ship" on the Mediterranean station. The "twenty years cycle," which is estimated by home and foreign authority as the extreme limit of the life of a "fleet-ship," has brought into existence a new "Dreadnought," with speed that, twenty years ago, would have been considered high for a swift cruiser, and gun power that would sink two of her earlier namesakes in a very short space of time, with but very little damage to herself, and a feature of unsinkableness which it is hoped will render her impervious to microbic attack! And finally a displacement which should largely augment her capacity for carrying fuel and ammunition per inch of immersion.

So that, without taking up your time with details of the ever-increasing tonnage, speed, and gun power of our sixty built and proposed "fleet-ships," I may take the example quoted as fairly typical, and use it as evidence in support of the correctness of my contention in 1887, where I stated:—

"We are assured, both on home and foreign authority, that the 'microbe' is to eat away the 'mammoth' from off the seas; but I am inclined to think that it will be some years yet before the microbe can act without the mammoth as a base. As long as you have to carry monster guns to attack forts and shell arsenals, so long must you have monster carriages (*i.e.*, fleet-ships) in which to transport them. So that the action of the mammoth and the microbe must be blended

for mutual support in the unit, division, squadron, and fleet of the future."

During the time that has elapsed since the above statement was made there is nothing so remarkable as the prominence that has been given to "gun power" by the naval architects and ordnance committees of all maritime nations, together with the strenuous and laudable efforts which have been made by all concerned in perfecting the British Navy so as to insure the huge and crushing projectile hitting the object aimed at, even at the comparatively enormous ranges at which practice is now carried out. Ships may vary in the excellence of their target practice, but there is not a shadow of a doubt that the standard of shooting has been raised in an equal if not in a greater ratio than the increase in gun power.

It is this combination of power and accuracy that has robbed the ram of the destructive powers attributed to it, and placed the torpedo in the second category of weapons for fleet attack and defence, while it has raised the gun to a position where it has at present no rival as the destructive weapon best suited for the annihilation of the adversary.

In my earlier efforts to deal with this question, notably in the essay of 1880, it will be seen that, while in favour of the use of gun power during the approach, I was distinctly of opinion at that time that the ram held a most important, if not the first place in a naval battle. My statement was: "The general principle on which every captain would fight his ship would be to try and disable his enemy by making the best of his artillery fire; making it very uncomfortable for those who are guiding his opponent's movements, trying to penetrate his vital parts, and blow up his magazine, damage his engines or screw, and generally speaking, to give him as little time for cool consideration as possible. . . ." At the same time, I added: "Each captain must be ready for the one aim and object of all naval actions of the present day (1880), 'The fatal blow with the ram!' To avoid the enemy's ram and run your own deep into his side, is the one end and aim of tactical skill, and the best captain is he who attains that very desirable object in the shortest possible time" And I devoted four pages in order to substantiate my contention.

Though still convinced that the ram honestly held the position universally accorded to it 25 years ago, I unhesitatingly declare that under the crushing effect of the gun as developed to-day, it has no longer a place in a "fleet ship," as affecting the result of a naval battle. The same arguments may be advanced with reference to the torpedo as an offensive weapon in action, and I may say that I have never given the torpedo a very prominent place in considering its value in a fleet action, discharged from the "Fleet ship." The only use it could be put to would be as a means of defence, when the ship has become stationary, owing to disabled machinery or screw, and even under such a distressing *contretemps* I would prefer to rely on the gun. On the other hand, I am far from deprecating the value of the torpedo as a weapon in action, discharged from swift destroyers, organised as auxiliaries to the "Fleet-ship." On the contrary, I have always maintained and still maintain that they are indispensible, especially in a night action. I assert then to-day, and challenge contradiction, "that the gun and its protection and accurate discharge, together with a sufficient quantity of fuel and ammunition, are the

all-important considerations for the success of a fleet in action." There seems every reason to believe that notwithstanding the recent advance, ships and guns for fleet work will still grow. As I wrote in 1880: "If we judge of the future by the past, what monsters must pass in review before our imagination." And I added: "'Qui uti scit ei bona' may well be said of guns, and a thorough knowledge of how to use them in a fleet action will be *half* the battle." After twenty-five years' further experience, I would only alter the last phrase to "*All* the battle." The guns have grown, and the knowledge of "how to use them" may be estimated from the returns of the gun layers' and other competitions for 1905.

Another point consequent on the growth of ships and guns, is the necessity for larger docks, both at home and foreign stations. Twenty thousand ton platforms to carry guns of forty calibres and over, means a strain on docking accommodation, but depend upon it that the docks must and will grow to the ships, and from what we read, a move is being made in that direction.

Imperial Organisation of the Navy, Distribution of Force, etc.

In the 1887 paper I stated that "There is a tendency to speak of the British fleet as a whole. This is quite wrong and misleading, and I for one should like to see the practice discontinued. . . Both in the past and at present we have always had numerous bodies of ships, sometimes called squadrons, sometimes fleets, which composed the navy; so that without proposing any radical change, I may suggest that we should have a definite number of divisions, squadrons, and fleets 'fixed and fitted for use,' their nomenclature depending on their numerical strength in units. Thus a division would consist of three units under a rear-admiral or commodore; a squadron, six units, under a senior rear-admiral or vice-admiral; and a fleet, twelve units, under an admiral; each unit, division, squadron or fleet having its told-off adjuncts and auxiliaries, as shown in the diagrams, and a distinct letter, number, or other designating sign of its own, which should be carried by all the component parts belonging to it." To-day I am more than ever convinced that the organisation of the unit is imperative, and that we must learn to speak of fleets, squadrons, divisions, and units, as indicating complete portions of a whole. That whole being distributed on the various stations, and in home waters as desirable, to meet the ever varying eccentricities of international complications. The general tendency, since I last endeavoured to deal with the subject of Imperial organisation, has been to concentrate nearer home with a powerful connecting link between Channel and Mediterranean Fleets. List "A" gives the proposal in 1887. List "B" suggests what might be the existing distribution, and the other Diagrams give the composition of a unit, division, squadron, and fleet. (*See* Figs. 3, 4, and 5.) At the present moment we have sufficient "Fleet-ships" to form four complete fleets and a squadron; that is, nine complete squadrons, eighteen complete divisions, and we shall still have two spare units to fill up casualties. In 1909, supposing that the present programme is carried out, we shall have five complete fleets, or, on the assumption that spare units are necessary, we shall have six spare units to take the place of those sunk or disabled in our present force of four fleets and a squadron.

LIST A.—1887 PROPOSAL.

A.	Commissioned Reserve—Two Squadrons—Fleet of	12	27 First-class Mastless Rams.
B.	Mediterranean Squadron and Division	9	
C.	Channel Squadron	6	
D.	West Indies Squadron	6	28 First and Second-class Ironclads or Cruisers as most suitable.
E.	Pacific Division	3	
F.	Australian Division	3	
G.	East Indies „	3	
H.	China Squadron and Division	9	
I.	S.E. Coast of America Unit	1	
K.	Cape and West Coast Division	3	

L. First and Second-class Cruisers.
M. Armed Merchant Steamers.
N. Convoy.
O. Obsolete for Sacrificing.
P. First-class laid-up Reserve, one to every Division afloat.
Q. Building.
R. Remainder in Reserve.
S. Imperial Troopships.
T. Transports on Hire.
V. Ocean Volunteer Force.
X.
Y. Colonial Forces.

LIST B.—1906 PROPOSALS.

Distribution of Force.

A.	Round Coast and North Sea, 3 squadrons ..	18	Fleet units.
B.	Channel, 2 squadrons	12	„
C.	Atlantic, 3 „	18	„
D.	Mediterranean Squadron and Division ..	9	„
E.	Pacific Division Cruisers	3	Cruisers.
F.	Australia „ „	3	„
G.	East Indies „ „	3	„
H.	China Squadron Armoured Cruisers	6	Armoured Cruisers.
I.	Cape and W. Coast Division Cruisers ..		Cruisers.
J.	S.E. Coast of America unit	1	Armoured Cruiser.

K. Armoured Cruisers, patrol duty.
L. Other Cruisers, patrol duty and fleet duty.
M. Armed Merchant Steamers.
N. Convoy.
O. Obsolete for Sacrificing, Blocking Harbours, etc.

P. Laid-up Reserve to replace Fleet ships after Destruction of Opponent's Fleet ships.

Q. Building.

R. Launched and completing.

S. Small Craft.

T. Transports on Hire.

U. Under-water Vessels.

V. Ocean Volunteer Ships.

X.

Y. Colonial Force ?

With reference to lists "A" and "B" it is necessary to point out that I am confining my observations to-day to the organisation of "Fleet-ships," but such armoured cruisers as could be spared from protection duty, organised independently in squadrons, would require a somewhat similar arrangement for their fuel and ammunition supply to that proposed for "Fleet-ships," so that they would be prepared to co-operate with any fleet should such co-operation become necessary. Cruisers attached to "Fleet-ship" divisions would have to be provided for by the divisional supply organisation, and there is no doubt that some cruisers will have to accompany the "Fleet-ships" to protect the auxiliaries from cruisers or destroyers, while the main action is being decided.

Composition of Fighting Fleet.

In 1887 I stated that the only question then was "the getting together of so many vessels with their guns and rams to form a fighting fleet; but every day the reasons for adjuncts and auxiliaries are forcing themselves on us, and their existence renders a new and systematic organisation imperative. . . ."

I concluded the paragraph by saying: "I propose to deal with the composition of a fleet prepared for immediate action, and I hold that all divisions, squadrons and fleets should be so prepared at all times—the component parts, 'parent, children, adjunct, and auxiliary'—for opposition to the hostile force, from whatever quarter it may come, being complete and prepared as a whole, so as to be ready for immediate muster at a given rendezvous."

I repeat, and beg to accentuate, the same words to-day. The absolute necessity for having your coal or liquid fuel and ammunition supply under your thumb is far more vital now than it was twenty years ago. The importance of the means of filling up on the spot after an action with the whole or a portion of the opponent's force cannot be exaggerated. Rapid recuperation is now more than ever essential.

I will recapitulate in detail what I proposed and still propose as indispensable in the composition of future fleets.

First.—I propose to give the term "fleet" a definite numerical value and strength which I fix at twelve units, adding a squadron or second fleet when it becomes necessary or advisable to mass an overwhelming force for the purpose of intimidation or action on a given spot. Taking the available "fleet-ships" into consideration, and also the auxiliaries, upon which we could put our hand, and looking to facts and conditions as they stand, I am convinced that the best

numerical composition for Great Britain at the present time is, as I have repeatedly stated, in divisions of three units, two of which would form a squadron, joining up as many squadrons, with adjuncts and auxiliaries complete, as became necessary for the successful fulfilment of the required effort. Having proposed the number of units that should form a division, squadron, or fleet, I will now venture to lay down what I consider these units (Fig. 3) should consist of:—

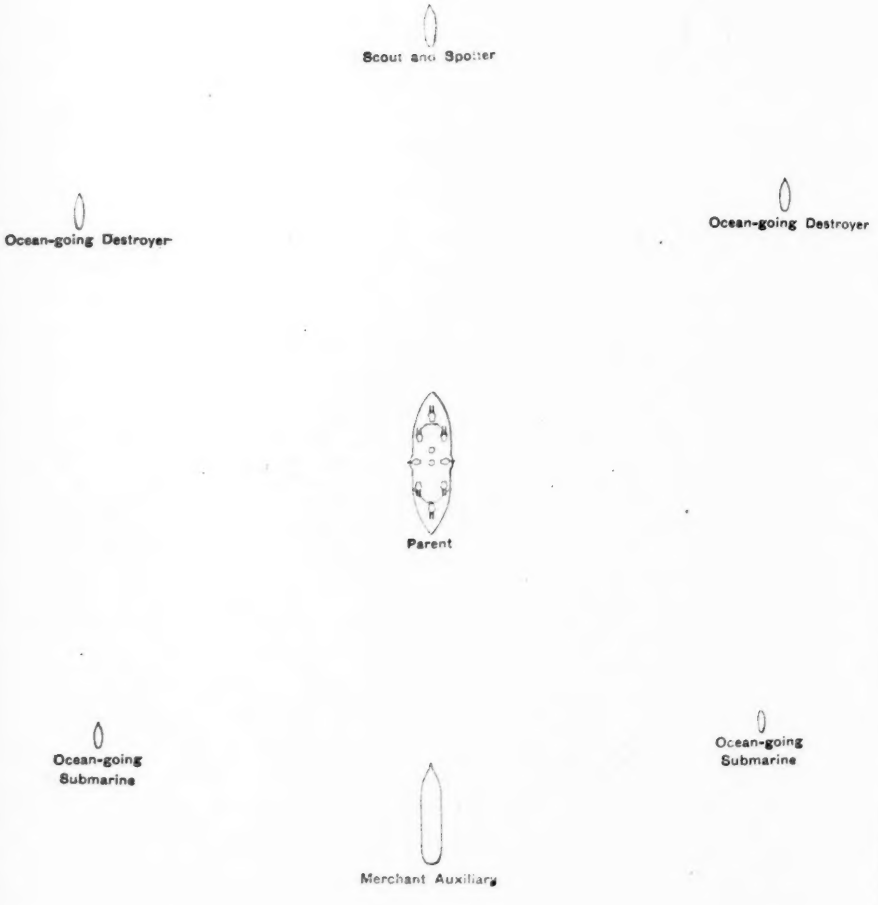
1. A "fleet-ship" as a base, which is merely a convenient name for what is variously spoken of as a "line-of-battle ship" or "ship-of-the-line." She should be of the highest speed and most piercing gun power, having one or two telescopic signal masts for semaphore and wireless communication, net defence, and an adequate number of protected Q.F. guns, and two captive balloons.
2. Two ocean-going swift destroyers, commanded by two of her lieutenants and manned by crews belonging to her complement.
3. Two ocean-going submarines, similarly manned and commanded.
4. A fast turbine scout, mine remover, fitted with apparatus for removing mine-fields, commanded and manned as before. She would act as lookout vessel when cruising and spotter in action, and always precede her parent when entering and passing through channels.
5. A merchant auxiliary carrying fuel, ammunition, stores, etc.

A Division (Fig. 4).—Every three units, when joined up as a division, should have definitely belonging to them, and for their sole use, the following auxiliaries:—

1. Two well-found and specially fitted fuel ships capable of carrying at least 6,000 tons of fuel each, one of which would always be on duty with the division, while the other is at the fuel depôt filling up. These fuel ships cannot be snatched up haphazard on the spur of the moment, and after their shoots, hatches, and winches or tanks have passed a rigid inspection they should be told off, lettered or numbered, and their captains given some insight into the manner in which a large force is moved on the open sea.

   Speaking generally, there should never be less than two thousand tons of coal, or its equivalent in liquid fuel, present with the force for each fleet unit.
2. A large merchant steamer with high speed and great cargo capacity to act as general store and ammunition ship, carrying boom gear, cartridges and projectiles, and fitted with accommodation for sick and wounded.
3. A torpedo and submarine depôt and telegraph construction ship, for laying and picking up electric cables, etc., carrying half the squadron complement of fitters, spare torpedoes, and electric cables. She should also be fitted with sick quarters and carry a medical staff.

PROPOSED FLEET UNIT



UNIT ORGANIZATION

FIG. 3.

In 1887 I suggested a powerful tug for each division, but I am now convinced that the work of towing disabled ships out of action, if such a feat were possible, would be better performed by the attendant cruisers, and I have therefore left the tugs out of this proposal. This force, with their respective scouts, destroyers, and submarines, would form a division under a rear-admiral or commodore.

The Composition of a Squadron.

The composition of a squadron (Fig. 5) should allow of its being more complete, but in the interests of perfect organisation and economy, it should be as nearly as possible double that of a complete division, gaining a saving where dovetailing is possible.. I would therefore suggest:—

1. Four fuel ships of 6,000 tons capacity, two always with the squadron, having the same qualifications as before mentioned.
2. A large, fast spare ammunition ship, having on board a proportion of cartridges and projectiles of the calibre of each unit. She must have capacity, as owing to the greatly increased weight of guns and limited reserve of buoyancy, the ammunition-carrying power of the "fleet-ship" will be severely felt in the future, and I look upon the spare ammunition ship or ships as next only in importance to the fuel ships. Take for instance our latest launched fleet-ship, the "Dreadnought" and her class, with a combined metal and powder discharge of half a ton per heavy gun. Notwithstanding their displacement and carrying power, they would require ammunition handy after bombardment or fleet action.
3. A large fast torpedo depôt ship of same capacity, with mines and spare torpedoes, carrying caissons and pontoons and all gear ready fitted connected with the laying of protective booms, and six mining launches. She would also carry such proportion of powder and shell as could not be carried in the ammunition ship.
4. A large liner fitted as a hospital ship, carrying the red cross by day and the electric cross by night, whose special and only duty would be to take on board all badly wounded and serious cases, and with the assistance of her tenders to pick up the crews of any "fleet-ships" that may have been sunk or set fire to. She would carry numerous steam hospital boats, and have a sea-going tender. If possible no sick or disabled men should ever go into action.
5. A telegraph construction and electric cable laying ship for picking up, laying, and tapping cables, etc. She would carry in her tanks cables of all sizes required for submarine mining, utilising spare space for carrying spare stores to meet all possible requirements of the squadron, and six mining launches.
6. A depôt ship for ocean destroyers and submarines not apportioned to the units. She would also carry the observation balloons and gas cylinders or plant for making gas, and aëroplanes and air-ships when perfected.

A DIVISION

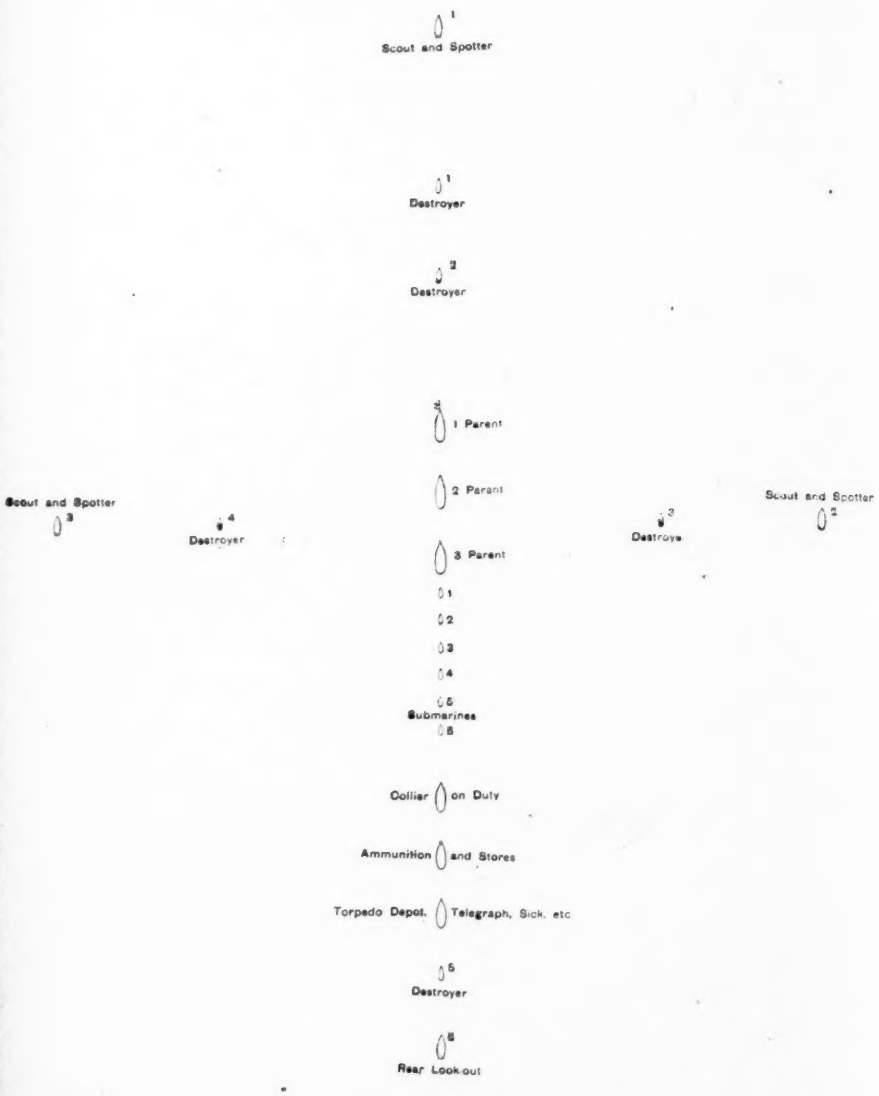


FIG. 4.

Each of these auxiliaries would take charge of the boats belonging to the fleet-ships during the action, hoisting them inboard if necessary.

It will thus be seen that for every parent or base there will be two destroyers, two submarines, and one mining scout or look-out vessel and spotter, and one large merchant auxiliary.

A Division.—Three units, *i.e.*, 6 destroyers, 6 submarines, 3 scouts, and 3 merchant auxiliaries, and 3 parents.

A Squadron.—Six units, *i.e.*, 12 destroyers, 12 submarines, 6 scouts, and 7 merchant auxiliaries, and 6 parents.

And a "Fleet" (Fig. 6).—Two complete squadrons joined up, twelve units, *i.e.*, 24 destroyers, 24 submarines, 12 look-out vessels, and 14 large merchant auxiliaries, and 12 parents.

This force would be capable of changing its locality at high speed. In addition to the unit adjuncts for defence, a torpedo flotilla will be required to act independently as a separate command. They would travel with (and assist the cruisers to defend) the auxiliaries from cruiser attack during action—one, two, or three to each, according to the number that could be spared from the combinations of the main attack. This composition can go any length, and you could, if absolutely necessary, mass your five fleets complete.

In 1887 I concluded the article on the composition by saying: "In my opinion the tendency in the immediate future will be to increase the adjuncts and decrease the number of parents."

I was, in this case, a bad prophet. The extraordinary increase in gun power and accuracy of shooting has brought about a contrary result, and so long as the gun maintains its present overwhelming position, we may safely predict that the only indispensable auxiliaries are: the fuel-ship, the ammunition-ship, and the hospital-ship, together with sufficient cruisers and scouts to allow of an efficient system of look-out.

Command and Responsibility.

Fleet organisation need not be changed. It still means the distribution of your force in the most compact form, marking the grades of command and responsibility at distinct points.

For instance, in the proposed fleet, the lieutenants or warrant officers in command of adjuncts would be responsible to their captain, who would, in his turn, be responsible for them and all connected with his unit, to the divisional commodore or rear-admiral, who again would be responsible to the squadron vice-admiral for all connected with his division, who would again be responsible to the commander-in-chief for his squadron. The commander-in-chief being, of course, responsible to the Admiralty and the country for the well-being of his fleet.

"In 1887 I proposed that every captain in command of a division should *de facto* become a commodore, or the rear-admirals' list be largely augmented." The latter suggestion has been adopted, and we have now sufficient admirals for the five fleets, ten squadrons, or twenty divisions, which would require, five admirals or senior vice-admirals, in supreme command of fleets, five vice-admirals or senior rear-admirals, in command of squadrons, and ten rear-admirals or commodores, in command of the remaining divisions.

The proposed composition of fleets, squadrons, divisions, and units is based on the assumption that recuperation (next after gun

power and accuracy) is the most important factor in naval warfare to-day.

I wish to place a wide gulf between the composition of a division, squadron, or fleet, and its tactical formation for battle.

A COMPLETE SQUADRON

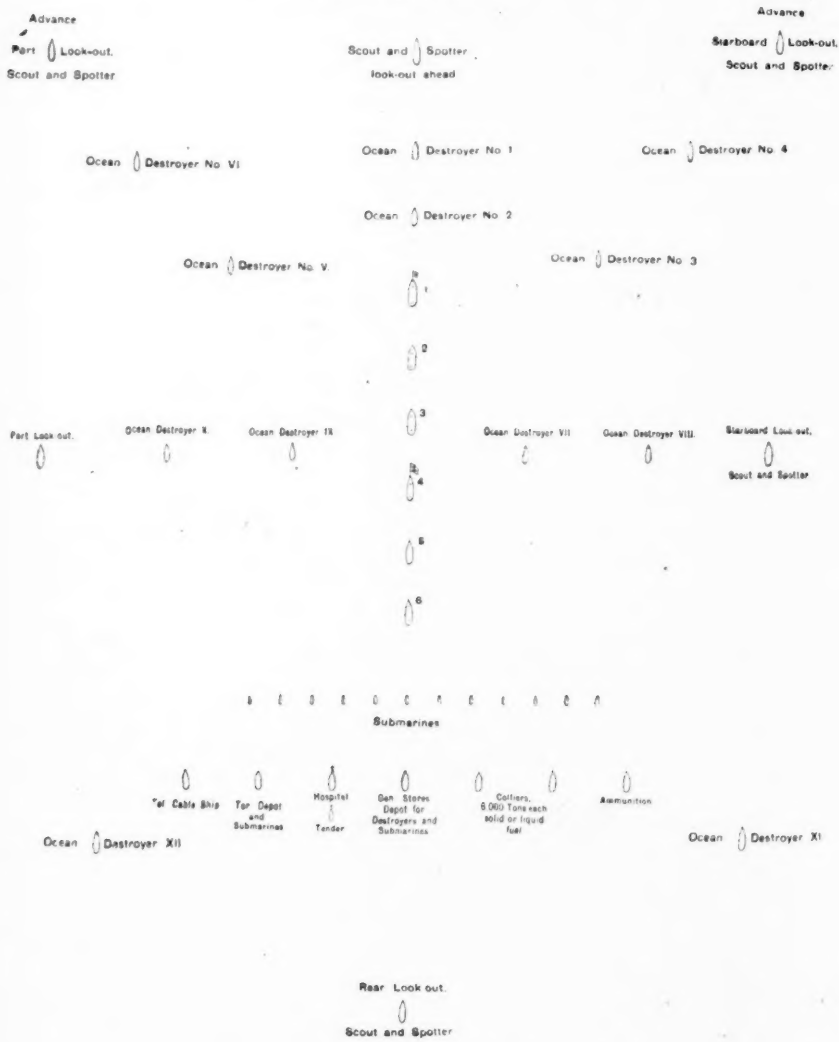


FIG. 5.

The first should be definitely laid down and prepared long beforehand, is probably now prepared. But to the admiral in command must be left the manipulation of the force for which he is responsible

to the country. In 1887 I stated: "We have yet to learn the most suitable and successful formation for attack and defence," and I advocated "perfection in all systems, and rapid changes from one formation to another."

Gun power and accuracy have again come to the rescue. The single line ahead has been proved and accepted by all to be the one possibility of a successful fleet action. Wheeling for a necessary change of direction, and altering course together when necessary, to take ground to the right or left. The single line has, in addition to its effectiveness for concentration of gun fire, the advantage of being the most simple and easiest kept of all formations, and requires the minimum of signals.

I now state without fear of contradiction that there is no known formation which the opponent could possibly take up, that would not place him at an overwhelming disadvantage when pitted against the single line ahead.

Therefore, it is clear to my mind that all systems of groups, pairs, double columns, bow and quarter lines, and other formations, some of which I have advocated in days gone by, are obsolete and useless. And why? Again, I say, owing to the overwhelming supremacy of accurate heavy gun fire.

All that it is now necessary to master is the art of following your leader in single line ahead without signals, taking ground to the right or left, by order, when an increase or decrease of range becomes advantageous—some simple form of altering course sixteen points together, completes all that can be required.

Peace Routine and Exercises.

I gave a large share of the space in the 1887 paper to the proposal for new routines and exercises consequent on the suggested removal of the yards and sails which I omit to-day, as it is needless to take up your time with a question which has long been included in the category of decided issues. But the principle remains the same. "The smartness, order, and also the comfort, of energy, force, no matter of what it is composed, still depends almost entirely on its system of routine and exercises, the arrangement of which should insure that the largest possible number are at all times receiving the utmost amount of instruction and benefit from exercises that will be of the greatest use to them when they have to assist in the numerous and different kinds of operations which the Royal and Mercantile Navy will be called upon to perform in any war sufficiently serious to endanger the safety of the Empire; and, at the same time, bringing no heavy strain on any body of men or portion of time. . . ."

The nature of the required instruction points to the development of the training class system, and assimilating the drills, aiming, and target practice, etc., to the home gunnery school courses.

Lay down your routine and drills, with a view to giving all hands the best chance of becoming S.G.T. Except ordinary educational subjects, nothing should be taught that is not connected with the protection of the fleet and the destruction of the enemy. In these divisions and squadrons, the criterion of smartness and efficiency will be the time taken to lay a minefield, build a boom, countermine a channel, out and in net defence, landing party complete, etc., and above all, the preparation of the ships for battle in every detail; and

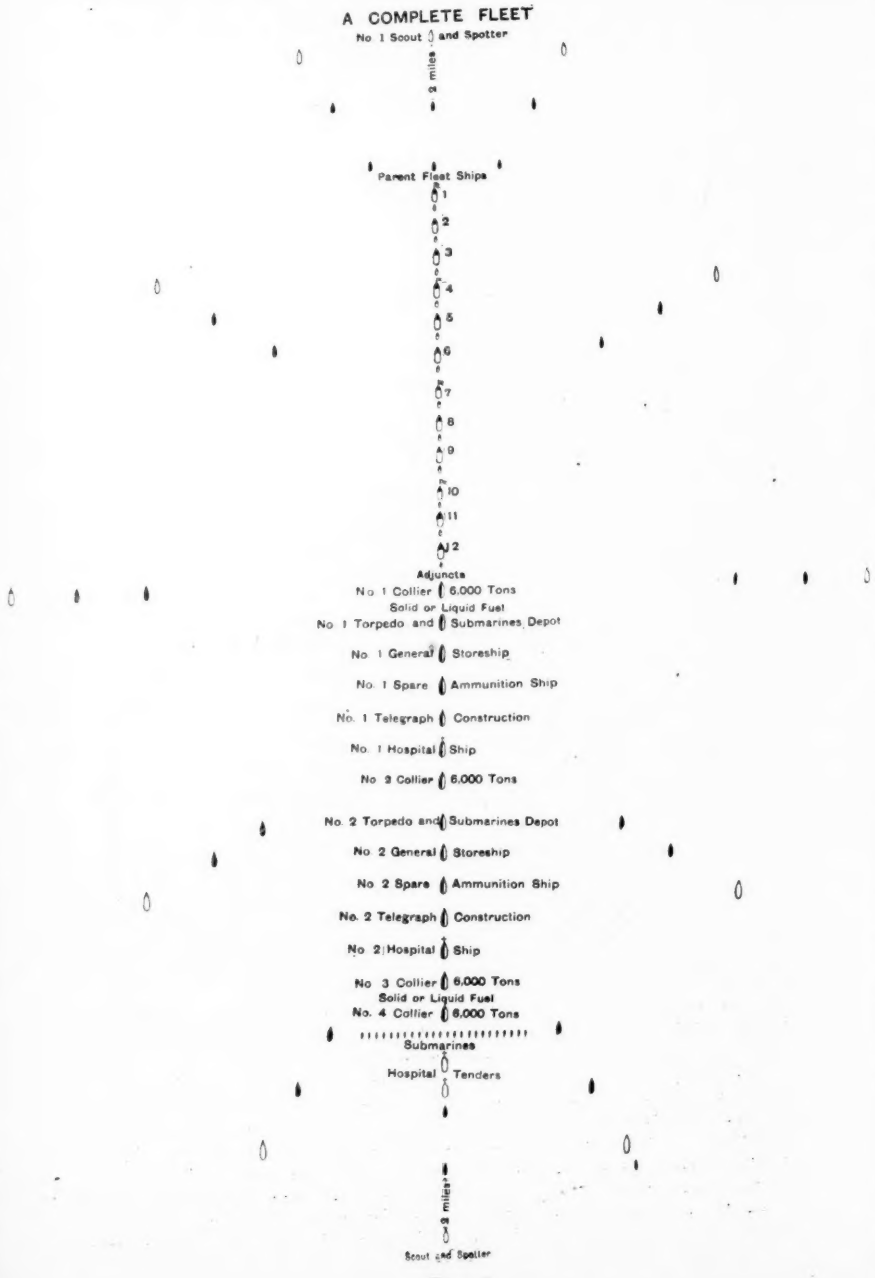

A COMPLETE FLEET
No. 1 Scout and Spotter
6 miles
Parent Fleet Ships
1
2
3
4
5
6
7
8
9
10
11
12
Adjuncts
No. 1 Collier 6,000 Tons
Solid or Liquid Fuel
No. 1 Torpedo and Submarines Depot
No. 1 General Storeship
No. 1 Spare Ammunition Ship
No. 1 Telegraph Construction
No. 1 Hospital Ship
No. 3 Collier 6,000 Tons
No. 2 Torpedo and Submarines Depot
No. 2 General Storeship
No. 2 Spare Ammunition Ship
No. 2 Telegraph Construction
No. 2 Hospital Ship
No. 3 Collier 6,000 Tons
Solid or Liquid Fuel
No. 4 Collier 6,000 Tons
Submarines
Hospital Tenders
6 miles
Scout and Spotter

FIG. 6.

a system of exercise practice instruction, which would insure that every man who (through casualties or other causes) may possibly become a "gun layer" would prove to be as perfect a shot as can be made.

Practice in peace what you would have to do in war. We know that the result of a fleet action will entirely depend on the ammunition expended doing a relative amount of damage. Tries are of no value, and it is only goals that count in this game.

Practice is the one and only means of attaining perfection. There is no such clear proof of the result of practice as in "out-and-in net defence." In 1886 fifty minutes was considered a smart time; in 1906 fifty seconds is considered fairly smart.

The continuous supply of cartridges and projectiles in action is one of the most important minor details, and must be duplicated or triplicated, to make as certain as possible that the supply will be equal to the demand, and will be forthcoming, so as to insure delivery at the gun, up to the very last charge and projectile.

Hydraulic or electric lifts, backed by hand gear as a last resort in the case of a breakdown, would seem the most suitable method under present conditions. Our principal difficulty is, that while power and accuracy of concentrated gun fire, with speedy recuperation, is the one important factor to-day, that will decide a fleet action, there are numerous other functions, such as the destruction of forts, mine fields, etc., which would tax the skill and energies of the officers in command, and that is the principal reason why I have advocated, and still advocate, auxiliary carrying power, so as to place all requisite material at their disposal.

For the reason already mentioned, I have omitted the portion of the former papers devoted to sea routine, but notwithstanding the adoption of the line ahead for action, we require to thoroughly exercise the fleet in precise manœuvres, anchoring, weighing, inverting, etc., and we must still exercise the parents, adjuncts, and auxiliaries to move in concert and carry out previously planned, combined operations. At least once a year, and for a period of not less than a month, the whole station force, or in case of the Atlantic, Home, and Reserve, the combined force, should muster and go to sea complete for war and carry out battle practice, one fleet against the other. During this time the manœuvres cannot be too real, and even risks must be run in order to insure high tactical training and skill, and all filling up of ammunition, fuel, and stores should take place at sea. I still adhere to the statement that the probability of the superior officers being killed in the early part of the action, and the certainty of ships being sunk or disabled, necessitates the establishment of a system of filling up casualties while at general quarters (as at gun drill), both in ships and officers. To make it entirely chance work the names of the ships, admirals, commodores, and captains, and name or rating of all commissioned officers, should be printed on cardboard discs, and placed in a bag on the poop of the flag-ship. During combined manœuvres, they should be constantly drawn, and the ships or officers drawn, ordered off duty by signal, the next in command taking the place of his superior, and if he should be the senior executive left, becoming responsible for everything connected with the ship. In 1887 I advocated the flag-ship changing her place on the disablement of the commander-in-chief; under present conditions no change would be possible—above all

things the line must remain unbroken, the places of ships driven out being immediately filled up by the remainder closing up.

For my former statement, that "the force should be constantly exercised in filling up with coal at sea," I wish to substitute: "Fresh supplies of fuel should always be taken in at sea, and never in harbour."

Look-out and Communications Under New Conditions.

Wireless communication means a large extension of your system of look-out, and with swift cruisers and scouts commanders of divisions, squadrons, or fleet should at all times know, not only where their friends are and what they are doing, and going to do, but also where the whole, or different parts of the opponents are, and what it is probable they are about to do.

We may fairly come to the conclusion that surprises, while they must be guarded against by an extended system of fleet look-out by scouts and cruisers, are not nearly as likely to be as successful as they have been considered by nearly every writer who has attempted to deal with this subject. But that is only one side of the necessity. The real aim of scouting and wireless is to find and come into contact with the adversary should he put to sea. History teaches us that this has always been an almost overwhelming difficulty.

Two factors in the problem have changed the conditions: distant communication, and rapid transportation of a force, quite independent of the wind and sea.

It should now be much less difficult, given that the opponent puts to sea, to find him, and bring him to a decisive action. The development of the air-ship will greatly add to the possibilities of obtaining accurate information, and besides their destructive power, they will be invaluable as scouts.

Rapid commissioning, though it should be instantaneous when necessary, is not so important, now that all ships that are in the first line are either in commission complete, or with nucleus crews.

Two principles seem to me to have been developed since I last had the honour of addressing an audience in this Institution: one, the getting rid of obsolete and useless hulks; and the other, the general preparedness for striking a blow, almost before the word.

The announcement of the declaration of war should include in the same paragraph the news that the adversary's main fleets have been sealed up or destroyed.

The strategical improvement in this connection has hardly yet been realised.

Unit Complement.

Taking into consideration the rapid growth of mechanism, and the numerous uses it is put to, which will increase rather than diminish in the "Fleet-ship" of the future; and also the reduction of guns' crews, notwithstanding increased gun power, it does not appear that the complement of a complete unit need greatly exceed that of the present "Fleet-ship," the increase being in specialist officers and reliable torpedo boat coxwains, gun layers, sight setters, etc. Here we are again helped by the fact that the general service officers and men are gradually dying out, and the gist of the education scheme is, that everyone will specialise in some form or other.

The unit crew should not greatly exceed five hundred all told, with ten per cent. of officers for all purposes. The ideal officer who will keep the forenoon on deck, the first in the engine room, and visit the sentries between whiles, while he drills his gun compartment and attends to the bags and bedding of his division, will have, it seems to me, just enough to do to keep him out of mischief. When the boilers and funnels go, they will, as a natural consequence, take a large proportion of the engine-room complement with them.

Boom Defence.

The enormous advance that has been made in the protection of our home and colonial ports by breakwaters, has, to a certain extent, reduced the necessity for carrying ready-made booms; but there are still many harbours of refuge where such a precaution would add greatly to the safety of the fleet, while taking a short rest for recuperation of figthing efficiency, and also for the worn-out officers and men. The boom would be carried by the auxiliaries in sections, and each unit of the force present would assist to reeve the hawsers.

The boom would consist of cellular caissons or pontoons, connected by large cellular built nun buoys, spreading six large flexible steel wire hawsers, interlaced with small short steel wire, with torpedo nets, carried by the store ships for that purpose, hung so as to stop submarines; the moorings and centre weight being supported by large buoys, between one and two fathoms below water. Besides defending the entrance to a harbour, this boom might also be laid to bottle up the adversary's destroyers or submarines, who had taken refuge in one of their ports, and so prevent them from making night raids on a blockading force.

Speed as a Factor.

Side by side with the increase in tonnage and gun power has come the increase of speed in the "Fleet-ship."

Notwithstanding that the advantage of high speed is severely criticised by an anonymous writer in the February number of *Blackwood's Magazine*, I place a very high value on the speed of the "Fleet-ship," and for many reasons. First and foremost, it is important, whether you use it or not, to have the option under adverse circumstances, such as overwhelming odds, etc., to force on, or stave off, an action instead of your opponent having that option; and secondly, in action tactics, with superior speed you may gain an advantageous position; with inferior speed you never will.

When the fleets are evenly matched in speed, the desirable T position will be extremely difficult to gain without dividing your force, but it can only be accomplished by having relatively high speed as compared with the opponent.

Speed again is necessary, in the event of a portion of the adversary's force declining to continue the action, in order to insure fully attaining the object of all naval battles, namely, the complete destruction or capture of the opponent's ships; and lastly, speed is the only element in the equipment of a fleet which will enable you to find your antagonist, and bring him to action.

Therefore, I state unhesitatingly, that high speed in a "Fleet-ship" is all important, and especially in the case of our most recent

addition to the fleet, where the gun power has increased in a greater proportion than the speed.

Whatever the "great possibilities of doing mischief because he does not understand" (which the *Blackwood* writer ascribes to the Whitehall autocrat) may consist of, at least we may be sure that, whoever the "Whitehall autocrat" may be, he deserves well of his country for having increased the speed and gun power of the "Fleet-ship."

I will conclude this portion of my subject by summing up the requirements conducive to the success of a "fleet action," gun power, control and accuracy of fire, protection, speed, capacity and recuperation, no top hamper, no boats.

Position.

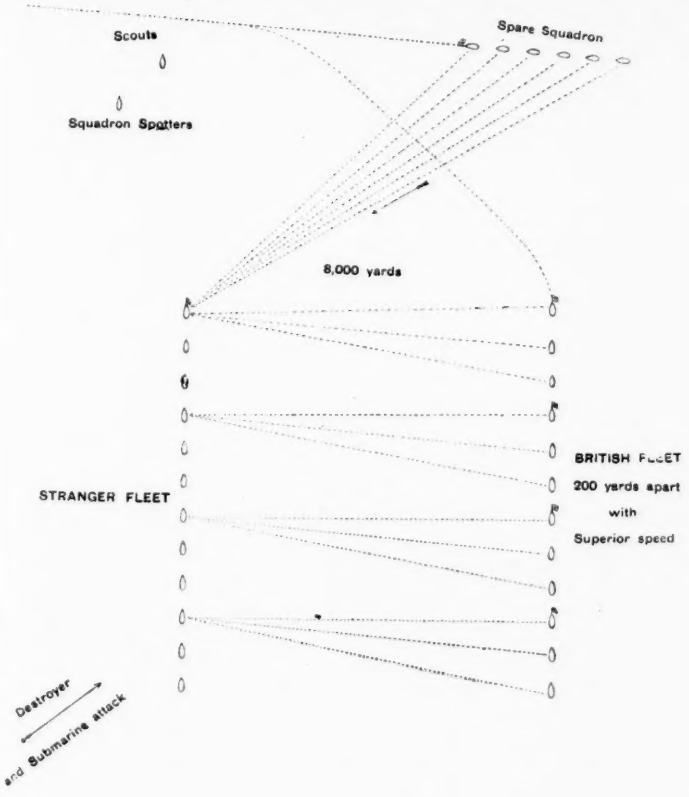
An adversary is feared and respected in proportion to the awkward position, from your point of view, in which he is clever enough to place you. Wellington's high opinion of Marshal Soult was based upon the fact that before going to bed he used to think over various plans which Soult might carry out during the night, and he invariably found that the Marshal had adopted the one which he (Wellington) disliked the most! So that in discussing the pros and cons of a fleet-action, it would seem to be the wisest plan to place the opponent in the position you would least desire him to take up, and that is probably the position you wish to adopt. Undoubtedly the T position is the one to attempt above all others, but it is improbable that either side can gain it with equal numbers, and you must be fully prepared for a position which you have reasonable prospects of taking up. Therefore is is clearly the policy to build, organise, equip, and train so as to have a decided advantage (in the more probable II—double I —position) in power, accuracy, and practised method of concentration.

It is only when in possession of preponderating force that you could attempt an attack from two or more directions; but with the strength which it is necessary for the safety of the Empire that we should always have at our command, you could make certain of having a fleet and squadron of "fleet-ships" or a fleet and squadron of armoured cruisers against any possible foreign combination on any given spot, and in that case you could keep your fleet intact abeam of the adversary, and cross the T with your spare squadron. With these odds (which we ought always to have at command), together with accuracy of gun fire, the annihilation of the adversary should take but very few minutes, which accentuates Napoleon's definition of the object of all strategy: "Reunir plus de monde que l'enemie sur un point donnée."

The Approach.

The best formation in which to cruise when you expect to meet the adversary is important. Your scouts should supply you with his numerical strength, formation, and course.

It would appear that "line abreast," auxiliaries ten miles astern, would give you an advantage, especially in thick weather. From that position you can quickly turn eight points together into line ahead when at your best range, and if the opponent is approaching in line ahead, end on, you gain the T position at once. If you approach


Scouts
Squadron Spotters
Spare Squadron
8,000 yards
STRANGER FLEET
BRITISH FLEET
200 yards apart
with
Superior speed
Destroyer
and Submarine attack

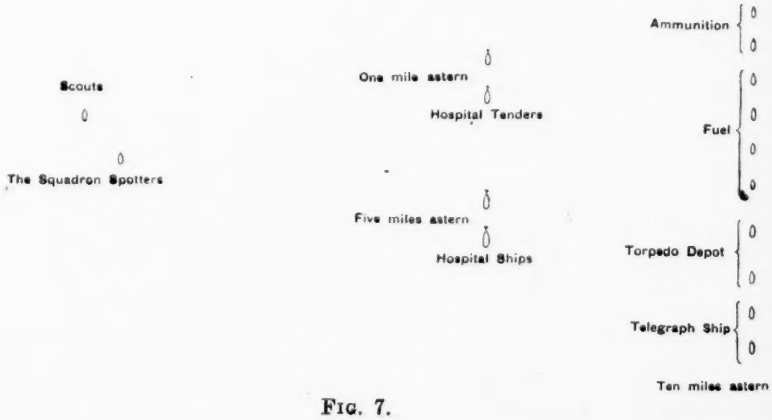

Scouts
The Squadron Spotters
One mile astern
Hospital Tenders
Five miles astern
Hospital Ships
Ammunition
Fuel
Torpedo Depot
Telegraph Ship
Ten miles astern

FIG. 7.

in line ahead you give the opponent the chance of meeting you with his line at right angles to yours, ahead of you, and so place yourself in the worst position.

I would therefore suggest that the best formation for approach before opening fire is "line abreast," forming line ahead and down masts as soon as you reach your accurate firing distance.

You would thus gain an advantage in thick weather and not lose it.

Concentration.

There is nothing new in the system of concentration, either in land or sea battles. It is an accepted axiom, and we have only to investigate the best method of applying the principle to a fleet action. In the event of our being fortunate enough, owing to fog, mist, or rain, to cross the T, we should of course concentrate on the leading ships, and so on down the line; but in the more probable contingency of the adversary being in line ahead on our beam, the question arises for discussion as to the number of ships required to concentrate on a given opponent, so that his fleet shall be destroyed one by one, two by two, three by three, or four by four, in the shortest possible time.

The conclusion I have arrived at is that it lays between three by three and four by four, and it seems the most natural that a division should undertake the destruction of its opposite number; therefore the 1st division should direct its concentrated fire on the leader of the opponent's line, then on No. 2, and then on No. 3; the 2nd division on No. 4, then 5 and 6; the 3rd division on the leader of the 2nd squadron, and then on Nos. 8 and 9; the 4th division on No. 10, and then on Nos. 11 and 12 (Figs. 7 and 8). Of course, a great deal would depend on the gun power of our fleet. A fleet of "Dreadnoughts" might concentrate two to one on weaker opponents, so that the commander-in-chief would be guided by the known comparative strength of the opposing fleet in giving his orders for proportionate concentration. I have drawn the concentration in the diagram at 3 to 1, but of course, as in all the points raised, it is open to your criticism and suggestions for improvement.

Range.

The question of range is of the greatest importance in a fleet action. It goes without saying that the ideal range is that at which you are sure of hitting every time, and the one object of all target practice should be, and is, to augment that distance, and so far as possible to gain a most valuable tactical advantage in that respect. The *juste millieu*, where you are certain and the opponent is only doubtful, is the range you would naturally adopt. For the sake of example I have used 5,000 yards, but with practised and reliable gun-layers I should adopt their utmost limit of certainty, whatever that happened to be.

Strategy.

Before summing up I beg to submit to the audience two questions of strategy, which, to my mind, have long been of vital importance to Great Britain, and which specially affect the distribution of "fleet power" for war and the transport of troops to or from the Continent

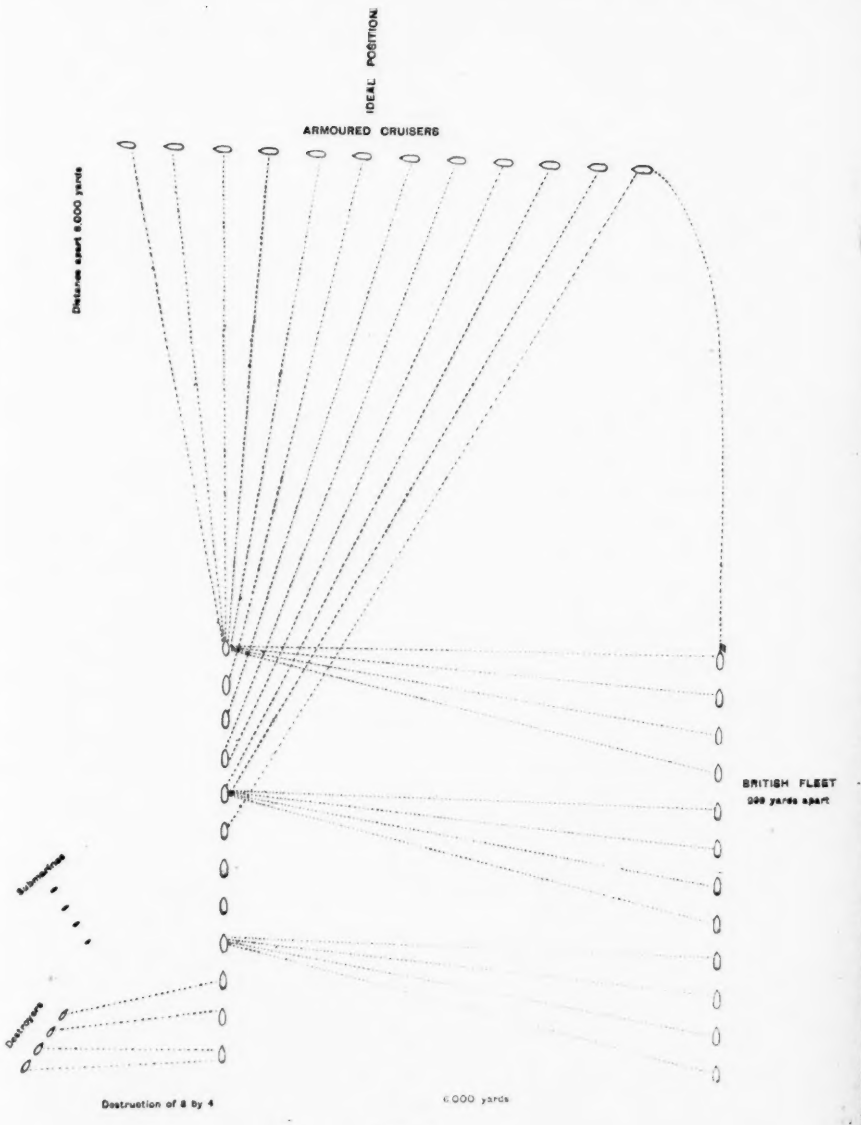

IDEAL POSITION
ARMOURED CRUISERS
Distance apart 6,000 yards
BRITISH FLEET
200 yards apart
Submarines
Destroyers
Destruction of 8 by 4
6,000 yards

FIG. 8.

by other means than over-sea. I allude to the Edinburgh and Glasgow Fleet-ship Canal; and secondly to the Channel Tunnel.

To me it seems incredible that with the ever-increasing necessity for rapid concentration, either in the North Sea or round our coasts, we have no way of rapidly cutting across the centre! especially as the means are at our disposal, and would be of great commercial value, in addition to strategical importance. The same may be said of the second question, so long and largely discussed. The advantages are all on the side of the two countries which it would join in an increasing bond of union, and should the present *entente* continue, which I hope and believe will be the case, both countries will have transport under-sea for mutual support. On the other hand, if an unfortunate difference should arise, which I trust will not be the case, either country would have the option of closing the tunnel in the time it takes to operate the handle of a sluice valve.

To sum up, I would lay down the following rules as vital for the success of a fleet action:—

1. To muster a greater number of "fleet-ships" than the adversary on a given spot, and to ensure recuperation at that spot.
2. By concentration and position to ensure the greatest number of projectiles hitting a given adversary in the shortest possible time.
3. To gain the position where the adversary can use his guns with the least effect, while you retain your full crushing power.
4. Keep your main fleet intact under all circumstances, detaching extra "fleet-ships," armoured cruisers, destroyers and submarines as necessary.
5. Prepare for the necessity of attacking the opponent broadside to broadside, crossing the T with extra force, and organise an independent attack on the opposite quarter by destroyers and submarines on weak points; shoot straight, and don't be put out by the concentrated fire of your opponent, or the sinking of a ship or two on your side. Use all your skill to keep your line steady.
6. Recuperate the moment the action is over. Tranship all wounded that can be moved, and fill up casualties from auxiliaries.
7. Generally speaking, think out and try to make use of the latest inventions up to the last moment, and by training do your utmost to obviate the necessity of making any but the most simple prearranged signals after the masts come down and the flag-ship opens fire.

In conclusion I beg to repeat that no one can regret more than I do that we cannot carry all we require on one keel, and to some it may be a matter for regret that our wants cannot be carried by ships whose officers and men belong to the Royal Navy; but we have to deal with facts. That we shall have a number of component parts—Royal, Reserve, and Volunteer—working together under sub-heads, who, again, are acting under a supreme director and organiser, is a

fact which is brought home to those who study the subject. This means, as Sir Donald Currie pointed out years ago in a valuable paper on maritime warfare, "*Preparation long before wanted.*" It means that a combined and systematic organisation of our gigantic Royal and Mercantile naval resources is imperative, and from what we hear, we may assume that it is making rapid progress.

> "Systems in his perception roll,
> Whose all-informing mind directs the whole."

When I last wrote on this subject there were many dismal prophecies as to the deterioration of the British seaman owing to the loss of the sails and consequent drill aloft. What is the result? We have produced the real seaman-gunner and gun-layer. The man whose business in life is to load quickly and shoot straight. As is the case in all communities, the necessity of the hour has produced the man.

Get rid of masts, funnels, and boats, as targets courting disaster, and, as I said in 1887: "Leave only a boat-hook on which to hoist the Union Jack, and depend upon it when the time comes its spots of glory will rival those of past ages, or it will wrap itself as a shroud round the ships and crews, who may yet go down with their colours flying."

ROUGH ESTIMATE.

1905 BATTLESHIPS READY.

GREAT BRITAIN	742,000 tons in 56 ships
FRANCE	280,000 tons in 28 ships
GERMANY	186,800 tons in 17 ships
UNITED STATES	151,600 tons in 14 ships
ITALY	137,100 tons in 11 ships
AUSTRIA	53,700 tons in 8 ships

1909 BATTLESHIPS READY.

GREAT BRITAIN	846,200 tons in 60 ships
UNITED STATES	345,600 tons in 26 ships
FRANCE	325,900 tons in 29 ships
GERMANY	260,800 tons in 22 ships
ITALY	160,000 tons in 13 ships
AUSTRIA	85,500 tons in 11 ships

ROUGH ESTIMATE.

ARMOURED CRUISERS, 1905, READY.

ENGLAND	258,400 tons in 25 ships
FRANCE	157,000 tons in 19 ships
GERMANY	37,700 tons in 4 ships
ITALY	32,300 tons in 5 ships
UNITED STATES	17,700 tons in 2 ships
AUSTRIA	11,500 tons in 2 ships

ARMOURED CRUISERS, 1909.

ENGLAND	436,900 tons in 36 ships
FRANCE	222,300 tons in 24 ships
UNITED STATES	189,500 tons in 15 ships
GERMANY	68,200 tons in 7 ships
ITALY	50,000 tons in 7 ships
AUSTRIA	18,800 tons in 3 ships

Admiral Sir Robert H. Harris, K.C.B., K.C.M.G. :—I think before I say a word about the paper, I should congratulate the Institution on having at last obtained a really valuable naval paper. The only fault that I can find with it is that it is too exhaustive. I also think it would have been greatly to the advantage of the Institution if it had been divided into, say three or four parts. Each one of those parts so ably dealt with by our gallant lecturer would afford full scope for a large discussion. To deal with the paper paragraph by paragraph on its great merits would be impossible in the course of this short half hour. Our lectures, as a rule, do not run over half-past four or five o'clock, and I fancy it is four o'clock now. I think I may congratulate the gallant lecturer on his prophecies. There is no doubt that the prophecies which he made twenty or thirty years ago have many of them been fulfilled. I suppose it is equally reasonable to say that some of those he makes now may eventually be fulfilled, though to my mind many of them are very strange. The balloons, for instance. I have no doubt that a balloon would be most valuable to a fleet as a spotter; but when you are steaming fifteen or twenty or twenty-three miles an hour, where is the balloon to be? That would be a puzzle to me. No doubt science may overcome much, but at present I do not think the use of balloons as indicated to be possible. Again, dealing with the abolition of funnels and masts—and a most valuable suggestion it is—no doubt funnels and masts ought to go if we can dispense with them; but at present the whole thing turns on the internal combustion engine which the lecturer has alluded to. Up to the present I understand nobody has succeeded in getting an internal combustion engine to go well over 500-H.P. As our ships now run up to 30,000, and probably will run up to 40,000-H.P., it will be exceedingly difficult for this combustion engine to catch the reciprocating engine up. It may do so. If it does, it will undoubtedly be a great advantage in every way, both as regards fuel and many other points. As regards the masts, I suppose we must still have some place to hoist our flags—the admiral's flag and the Union Jack. If you put them up in the balloon, when you are going twenty-three or twenty-five miles an hour, they will be half a mile astern or probably trailing in the water at that pace. No doubt the gallant lecturer has fully realised the value of the submarine, and no doubt the submarine has come and will stay, and it is on this internal combustion engine that the big submarine depends. At present you cannot have a very big submarine, because you cannot have a big enough internal combustion engine. If we really do succeed in getting a large ocean-going submarine she will undoubtedly be a terror on the seas. Probably she will not be a submarine—she will be a submersible vessel, which, though different, is practically the same thing. I will confine myself entirely to dealing with only the first page of the paper, and as there are probably many other gentlemen who would like to speak, I will not trouble you any further. I would, however, again express my regret that the gallant Admiral has not given us this very valuable essay of his —I call it an essay, really—in three or four portions, which we might have had the pleasure of listening to on three or four afternoons, instead of having it all in one afternoon.

Vice-Admiral W. H. Henderson :—I agree with Sir Robert Harris, that the paper is too exhaustive to attempt to criticise the large number of points raised by it, many of which are problematical, and will depend on future developments in invention, though some in the course of another generation will be far on the way towards solution. It is an historical

principle that the long-hitting weapon carries the day. The club gave way to the spear, the spear to the bow, the bow to the musket, and the musket to the rifle. Whatever is the longest range weapon must always be the one for primary consideration. I think each fleet-ship must be self-dependent; the more accessories can be got rid of the better; each class of vessel must have freedom to carry out its own special functions, and therefore each ship must have its own system of fire control. I feel certain control by other vessels will never answer. I am with the lecturer in his wish to get rid of everything that is useless, but proficiency of function must be maintained. The question of boats has been discussed over and over again. The Chinese left theirs behind, I think, in 1894. The point must be decided beforehand; they must be left at the base or risked; there will be no time to hoist them out just before an action, nor could a set of auxiliaries pick them up then, drifting about as they would be. I heard the other day that an American engineer is well on the way with developments for large internal combustion engines; but whatever changes we have, I do not concur with the lecturer that engineering or mechanical skill will be less in demand. All developments will require it of a higher order and in greater quantity. Lord Cochrane, I think it was, who proposed to destroy Cronstadt with balloons, but as yet we are as far off realisation as he was. Again, and finally, I do not think a fleet-ship can look after two destroyers, much less two submarines; they must have their own separate parent-ships. Whatever the organisation of a fleet may be, the battle-ship must have nothing to do with mothering flotilla craft; she has quite enough to do her own work and keep herself efficient, coaled, watered, supplied with ammunition and all other necessities. They will not be necessarily with the battle-fleet; the captain of a ship cannot be wandering about to look for them, or can his attention be given to children of this sort; but this need not prevent flotilla craft being temporarily attached to fleet-ships for special purposes when required.

The CHAIRMAN (Admiral Sir N. Bowden-Smith, K.C.B.):—As no other gentleman appears to wish to offer any remarks, I will now move a vote of thanks to Sir Charles Campbell for his paper, and also, on behalf of the Institution, beg to thank the two flag officers who have taken part in the discussion. Complaints are sometimes made that we do not have sufficiently up-to-date papers on naval and military matters, but on this occasion the gallant Admiral has not only given us an up-to-date lecture, but has travelled somewhat into the future. I do not feel competent to offer any suggestions on his proposed new methods of propulsion for ocean-going ships and consequent abolition of funnels and possibly coal, nor can I follow him in aerial navigation and the development of air-ships; but in these days we cannot look upon anything as impossible, when we consider what immense strides we have made in our means of communication by the aid of wireless telegraphy, and also the possibilities opened up by balloons or kites of increasing the range of our vision or getting a peep into an enemy's harbour. Quite recently, when on a tour in the West Indies, I was informed that Admiral Evans, of the United States Navy, had in his cabin on board the flag-ship two photographs of his squadron taken by a camera suspended from a kite, the shutter being worked electrically from the deck. One photograph was taken at an elevation of 500 feet, and showed the squadron at anchor in Hampton Roads. It was very clear, and showed distinctly the men on deck and pulling in the boats. The other was taken at an elevation of 1,200 feet

of the squadron under way, the kite being attached to the stern of the flag-ship. Although, as I have previously said, I am not able to follow the lecturer into the future, I will offer one or two remarks on existing problems to which he refers. I am glad to notice that the gallant Admiral expresses appreciation of the present strategical disposition of our fleets, which, in my humble opinion, has immensely increased our strength, though the massing together of such a large number of ships may appear a menace to some of the other Powers. He has alluded to the speed question, and I agree with him that it is of very great importance. You cannot increase the speed of a ship after she is built, whereas you can supplement her coal endurance by having cruising colliers with a fleet, and coaling at sea when weather permits. Maintaining the bunkers full is of such vital importance that coaling under way must be a constant exercise. I am aware that two flag officers, whose opinion deservedly carries great weight, have recently stated that high speed does not give the tactical advantage usually ascribed to it; but even if that is granted, it appears to me that in sea as well as land warfare it is everything to get to the right place at the right time. The want of speed might involve a disaster or the loss of an opportunity. No one would, of course, wish to see in a war-ship everything sacrificed to speed, as is the case in a scout or a destroyer, but I would earnestly hope that in the designs for future battle-ships, when all the compromises are considered, the value of speed will be recognised. I well remember several years since the alarm caused to some naval officers by the prospective total abolition of masts and sails, and the fear expressed that our seamen would in consequence deteriorate; but it has resulted in officers and men concentrating their attention on more important matters, notably rapidity of coaling and improvement in gunnery. It must be a gratification to all of us to notice the zeal and attention now given throughout the fleet to target practise, which are producing such excellent results. I am doubtful if the proposed ship canal between Edinburgh and Glasgow is of sufficient strategical value to justify the cost of construction, and one could hardly expect it to be a commercial success, as its length would, I think, be nearly double that of the Manchester Ship Canal. Personally I am not in favour of the Channel Tunnel, preferring to keep our "silver streak" intact. I beg to thank the Admiral for his paper.

THEORIES AS TO THE BEST POSITION FOR QUICK-FIRING SHIELDED FIELD ARTILLERY.

ILLUSTRATED BY SECTIONS OF GROUND.

By Major J. F. CADELL, R.F.A., p.s.c.

I DO not for one moment wish to suggest that the views which I advance in this paper are either new or original, or that they are more than my personal theories, which may be entirely wrong. Theories, however, which may be right, must, to a certain extent, precede practice, though they doubtless are themselves the results of the observation of similar occurrences which have been experienced under somewhat parallel conditions. Nor do I claim that these theories, however carefully proved and supported by what may appear to be facts, are incontestable; but by attempting, as I shall, to apply them, firstly, to imaginary ground which may be considered as roughly typical of all ground, and subsequently to carefully drawn sections of ground which has been fought over, or which may be fought over, I hope to bring out clearly the strong points in favour of my arguments, and hope that the critical reader will draw attention to the weak spots and object where the chain of my argument may be at fault.

The course above sketched, which it is here proposed to adopt, is naturally itself open to criticism; it may be objected that the recent alterations in the weapon of the Field Artillery has altered the case. It is, however, hoped that by taking the line suggested, the clear teaching of history will not have been misread and presented to the reader under false colours. There must still be some value in history as a teacher, when we take full account of the altered tactical and technical conditions.

It is hoped that some good will be done by this attempt to reduce theories to something like concrete facts. The making of the theories in a way tangible may help us to realise more fully the rather complex ideas which the problem under discussion forces upon us. There is always a danger in thus attempting to materialise theories, and that we carry away the theory and imagine we have a fact.

Nothing which follows is intended to be a criticism on "Field Artillery Training," as there is nothing there with which the author in any way wishes to disagree. There are some paragraphs which might be written in very large type in support of the deductions which will be arrived at, while doubtless others might be read as not being at all in favour of these views.

The object of this paper is, however, rather to combat views which seem to be gaining ground in the Army and Royal Artillery quite independent from the teachings of the Training; views based

on hearsay war experience and theory. These, though they are not deliberately supported by "Field Artillery Training," are not vehemently combated by it.

The general tendency of modern field artillery thought on the subject of the best tactical for quick-firing shielded guns, seems to trend in the direction of giving undue value to cover, and to vastly over-estimating the advantages of indirect fire. These views in turn cause great value to be placed on a position for guns far removed from the crest of any ridge, and on the reverse slope, and, at the same time, treat the exposure of guns on the sky line to be something not very far removed from a crime on the part of any artillery commander.

The two main theories which I wish to advance and to support by argument are in direct contradiction to this tendency. Enunciated as briefly as possible, they are as follows:—

a. That generally the best position for quick-firing shielded guns is, other things being equal, at or very near the crest of a hill, rise or position, in fact, wherever the best view from the guns can be obtained.

b. That though, of course, unnecessary exposure is to be deprecated, there is no harm in taking up a position on the skyline should it otherwise be the best, since it is not necessarily at all easy for an enemy to range on the skyline, and that the skyline is more often than not merely a relative expression, and can in no way refer to any definite spot.

c. What is required of quick-firing shielded guns is to be in a position where they can cause most damage to the enemy, and not to trouble to avoid loss, since their shields make them at present almost invulnerable at fighting ranges.

It can scarcely be said that the above views are quite orthodox. I am, therefore, afraid that many will throw aside this paper as rubbish when they have read thus far. For this reason "Field Artillery Training" is here quoted in support of these theories before going any further, as otherwise it might be said that the original premises had already been violated.

"F.A.T.," p. 171 (*a*):—"The position, if not behind cover, should give a clear view over the sights, not only of the target, but of all ground on to which fire may have to be turned."

Pp. 172:—"The approaches should facilitate the supply and replenishing of ammunition." . . . "The ground in the neighbourhood should not be such as will enable the enemy to approach unseen." . . . "The position should be difficult to range upon."

There is more here in favour of my argument, but perhaps the following, on page 176, is most to my point. It appears under the main heading of concealment, and is talking of positions near to the crest:—"These positions have the disadvantage of often entailing the maximum of running up by hand with the minimum of concealment. There is, however, little dead ground, and troops on the move can be dealt with and fleeting opportunities taken advantage of."

Is not the essential attribute of the quick-firing shielded gun, that it is capable of remaining in action when exposed to fire, and not be destroyed, or, indeed, receive much damage? Is not its great power

mostly useful in the way in which it is capable of taking advantage of fleeting opportunities? We all know the dangers of dead ground, while surely many of the targets in future battles will be most vulnerable when in rapid movement. Can any position, which is not suited to take full advantage of the main characteristics of the weapon, be considered as at all applicable to that arm?

Yet do we not hear a great deal too much of covered positions and indirect fire? Indirect fire has doubtless its uses for guns, but they should be few and far between. The chief ones seem to be in semi-siege warfare, where prepared defences make movement on the part of a combatant unlikely, and to hit targets at practice camp where there are not more than three suitably placed targets to attack from any hidden position.

The great difficulty in war must be to get into the best position, unseen if possible, but to get into it somehow, and then either to fight there or advance or retire from it as may be necessary. If this be true, every effort in peace training, whether at practice camp or at manœuvre, should be directed towards the occupation of, and the fighting from, the best positions. It follows that all time expended in shooting from covered positions is wasted, after the original difficulty of commanding a battery and controlling its fire from a distance has been overcome.

We find in criticisms on the late war in the Far East, that artillery should be placed where it can "best co-operate and see," that it is only fulfilling its mission when it is "an immediate menace to every living thing within range." Surely it can comply with neither of these requirements when, from a hidden position far removed from the crest, it can only co-operate by the application of the somewhat slow siege artillery methods, and when, from the very nature of its trajectory, much of the ground to the front cannot be touched under any circumstances by its fire, unless an advance be made which may then be quite impossible.

Colonel Nowikow, who is the strongest advocate that I can find of these far retired hidden positions, begins by criticising the Japanese for taking up positions near to the crest. He then complains that they always turned their fire at once on to any moving target within range, and kept the Russian gunners from their guns. He then explains how he fought his brigade from positions far behind the crest, shelled a bridge, or some other fixed targets, and how he suffered no losses; he claims some negative results, but no positive advantage to his own side. It appears to me that the Russians may have had no losses when they used these positions; they certainly, according to their own telling, sometimes fired 500 rounds per gun in a day, but I fail to find that they won any battles by their handling of artillery. The Japanese certainly hid their guns, but fought them from places where they could see if not be seen.

A Russian battery, which had been provided with temporary shields by its commanding officer, was in action on a forward slope of a hill; it suffered practically no loss during a whole day, though exposed to both artillery and infantry fire. It is, however, a curious fact that the battery commander, who quotes this very immunity from loss when thus exposed, is a strong advocate of the retired position without giving any reasons; he is also strongly in favour of entrenchments, though acknowledging that they rather tie a battery.

It would appear to me that there was such a spirit of caution in the Russian artillery that it was quite incapable of supporting an infantry attack, and that this may well account for some of their want of success.

Now leaving these generalities it is proposed to discuss the possible positions for artillery in detail on typical ground studied in section. Whatever grows in the ground or is built on it, may, and very often will, affect individual cases, but these things do not alter principles. Though other things influence a position to some extent, every round fired has a definite relation to the section of ground over which it is fired.

On a level plain, the position taken up by the guns is obviously only a question of range and view, and is therefore dependent on the atmosphere and artificial accidents.

In all the sections here shown, "D" is the side of the defence, and "A" that of the attack.

It is first proposed to consider the best positions for the defence in all the cases, and then to proceed to the consideration of the attack:—

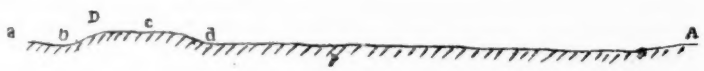


FIG. 1.

Figure 1 gives the first section of ground which it is proposed to study. The height of (*c*) above (*a*) and (*d*) being small, say under 20 feet, the slopes at (*b*) and (*d*) both being gradual. There are here, as will be found in each subsequent case, several possible positions for the artillery. There is the position at (*a*), from which, if (*c*) be very low, and the slope (*c*) to (*d*) be very gentle, all the ground over which an advance can be made will be exposed to fire; there is the position at (*b*), from which there must be some dead ground near (*d*), its extent depending on the height of the mound (*c*) and the slopes; then there is (*c*), which gives command and view as well as the advantage, if it be allowed to be an advantage, of direct fire; and lastly, there is (*d*), from which there cannot be so good a view as from (*c*), and where the question of ammunition supply must be a serious difficulty. In this case (*b*) seems to have no advantage over (*a*) as a position for guns, while (*c*) should be a more useful position than (*d*), on account of the greater possibility of movement, if for no other reason. Thus, in this case, the choice lies between some spot near the top of the rise, and a point a considerable distance in rear of it, so arranged that the curve of the trajectory, plus half the cone of dispersion, may, if possible, coincide with the slope of the hill between (*c*) and (*d*); in any case, a shell which just clears (*c*) should sweep a good deal of the forward slope. It appears to me that there is more to be said in favour of the position well behind the crest in this case than in any other. In flat country command will be difficult to obtain, and very valuable, but circumstances might make it possible for artillery at (*a*) to be commanded from some spot near (*c*) without much loss of effect.

Figure 2.—The hill or rise taken up here as a line of defence is supposed to be of considerable height, in any case over 20 feet, and

the slopes are steep though not impassable. The disadvantages of positions at (*a*) and (*b*) are more accentuated in this case than in Fig. 1. It may be necessary to come into action at (*d*), but the (*b*) position is only suitable for howitzers, with which weapon we are not dealing. The position at (*a*) is obviously more and more disadvantageous, as the height of (*c*) above the plain increases, since the zone of dead ground to front of (*c*) becomes wider. (*c*) has the normal disadvantage of exposure common to all crest positions, but it has the incontestable advantage of being so placed that everything

FIG. 2.

can be seen from the guns, while the ammunition supply is fairly easy, and an advance or retirement are both possible. When the surface of the ground makes (*c*) impracticable for artillery, a choice may have to be made between (*a*) and (*d*), in such a case if a retreat may be expected, there are incontrovertible advantages in the (*a*) position as (*c*) by its nature is equally denied to the attack. It may, however, be doubted if the influence of the artillery on the ultimate fortunes of the battle is likely to be great when it is so placed.

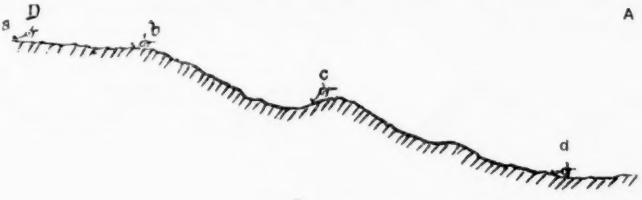


FIG. 3.

Figure 3 represents ground gradually falling to the front, the distance between (*a*) and (*d*) being considerable. In this case, unless the slope be very gradual, there will be a good deal of dead ground in front of any position (*a*). It is also quite possible that guns posted at (*a*) which commanded ground in front of (*d*), would not be able to advance to (*b*) at the critical period of an action when well directed artillery fire might decide the fight. On the other hand, the position at (*b*) should leave no dead ground, while it still retains the advantage of fairly easy ammunition supply, and also the possibility of advance or retreat. Though these movements may be difficult, they should certainly be more easy than is probable from any position (*c*) further down the slope. Guns at (*b*) are perhaps more easily seen than if placed at (*c*), but it is really harder to range upon (*b*) than (*c*) once the presence of guns at either place has been detected, unless the hollow behind (*c*) is considerable, in which case (*c*) becomes the crest of an advanced position. The position at (*d*) is one which

would only be occupied if the local circumstances made it impossible to use any of the others.

There will naturally be some cases in which the total distance (*a*) to (*d*) may be so great that both (*a*) and (*b*) are out of question as possible positions, owing to the length of the range, then either (*c*) or (*d*), or some modification of these, must be selected. Much will depend upon the reason for which the defensive has been adopted.

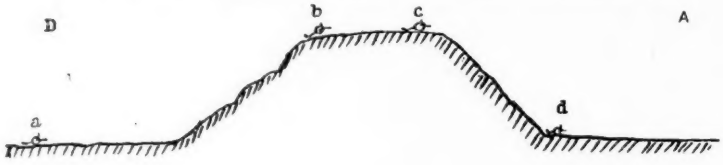


FIG. 4.

Figure 4 represents a steep-sided, more or less flat topped hill, such as exists in many sandy formations. It probably is always a bad position, but may easily be the only one available. The position at (*d*) can only be chosen where there are some other means of retreat than up the slope (*d*—*c*), which is probably very exposed and difficult. No position, except in fortress warfare, can be considered good in a defensive action from which retreat must mean annihilation. The position at (*c*) will probably leave some dead ground at (*d*), but not nearly so much as if (*b*) were selected. Any position (*a*) can only be considered suitable for guns of position or howitzers, as it gives up the whole of the ridge which we presume is the defensive position that has to be held against attack.

FIG. 5.

Figure 5 represents continual undulating ground; the treatment of this ground will, in some ways, be similar to the former cases, but much depends upon the distance apart of the various crests. If these crests be 10,000 yards apart, there will be positions at each of them, while if they be but 500 yards apart, it is obvious that the conditions are quite different, and that it is a country unsuited for long range artillery tactics. In such a case the time which any attacker is exposed to view near (*f*) and (*h*) will be so small that probably most commanders would feel that they could get more out of their guns from (*b*) than if they were placed in comparative security at (*a*) or (*c*). The commander must be at or near (*b*) to obtain any insight into the tactical situation, the time which attacking infantry is exposed at (*f*) or (*h*) may only be a matter of a minute or two. Surely, in such cases the quick-firing gun should be in a position from which it can, in the shortest possible time, use to the fullest extent its power of rapid fire. The shielded artillery of the defence at (*b*) should not be put out of action by the indirect fire of attacking guns at (*e*) or (*g*), or beyond (*h*), and it should be in a good position

to overwhelm them should they attempt to come into action near (*f*) or (*h*) in support of an infantry attack. There can be no doubt that in such ground a commander will be very tempted to take up a position in a hollow, if the slopes be gentle; but even with the most careful preparation it seems to me very doubtful if it will be possible to at once open effective fire and check the attack as efficiently as from the crest. It might be extremely difficult to range on (*b*) owing to the false crests.

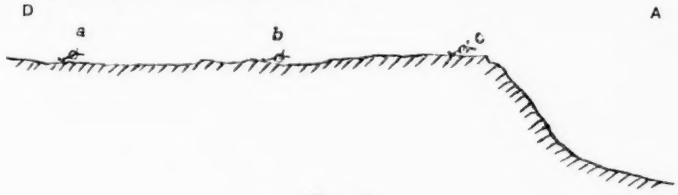


FIG. 6.

Figure 6 is the last case which it is proposed to consider; this represents a long reverse slope. In such a case (*c*) may appear to be tactically an indifferent position, and, from the point of view of fire effect, there are objections to it, especially if the slope in front of (*c*) is very steep. But if the artillery be placed at (*a*) or (*b*), it seems to me that the position at (*c*), whatever it may be worth, is given away to the attacker's infantry, since defending infantry at (*c*) could scarcely be expected to hold its own against an attack supported by guns in reply to which it could only bring indirect gun fire at very long ranges. The retired position at (*a*) may be good where the slope (*a*) to (*c*) is very long, and when the slope to the front of (*c*) is so steep that the attack cannot bring artillery on to (*c*) to support his infantry after taking the crest of the position.

It would seem that the first and the last cases dealt with, Figs. 1 and 6, are those in which the retired position is least objectionable, and that there might be cases in which the defence was partially justified in taking them up. I am, however, inclined to believe that in the 6th case the position near (*c*) is the best at first, enabling the artillery to engage infantry, and rapidly moving distant targets. It can be retired to the (*a*) or (*b*) position, and continue the action from thence should the tactical situation make it desirable, or if the volume of fire of the attack make it absolutely necessary.

So far the theory of the defence has alone been treated. The positions taken up by defending guns will probably be influenced in a considerable degree by the positions which are at the disposal of the attack. Perhaps, by a brief consideration of the various forms of attack on the above six typical positions, it may be possible to make my views clear, as to how far these defensive positions influence the probable attack, and are in turn somewhat affected by it.

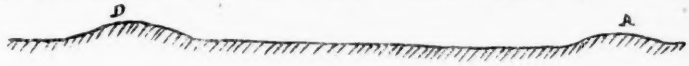


FIG. 7.

This is to illustrate an attack on Fig. 1. The attacker may have a convenient hillock or rise (*A*), and if so I hold that the point nearest to the crest to which he can bring his guns will give him the

best chance of engaging the enemy at or near (*D*) effectively. He may stop behind (*A*), but if the attack be a main attack his fire will be comparatively feeble and ill-directed, failing to give effective support for as long a time to the infantry, and thus less likely to ensure success. The attack (*A*) may be on the level, then the choice of position depends on artificial cover. Should there be, on the side of the attacker, any really commanding ground, the more command he can get for his guns within effective range, the better able he will be to dominate the artillery and trenches of the defence. Such commanding ground is unlikely, as the defender's position is thus obviously not suitable for defence. In the case of a very passive defence, such as in fortress warfare, and in a deliberate attack, there can be little objection to any covered position so long as a place exists from which the dispositions of the defenders can be observed, but then the fighting takes to itself the nature of a siege, and naturally, artillery tactics follow on the same lines.

FIG. 8.

In the attack on ground similar to Figure 2, from a position of the same kind or of the type of Figures 3 or 4, which is available for the attackers, the first consideration is naturally how to get rapidly into a position within range. If the enemy is at or near the crest, any movement will be checked at long range; but if he is behind cover a rapid advance may bring the guns safely to within 3,000 yards, where local conditions will have to determine the position actually taken up, it being borne in mind that the great object is to assist the advance of the infantry by silencing the guns of the defence, by keeping the heads of defending infantry under their parapets, and by withering at once any attempt at a counter-attack.

If quick-firing artillery can carry out these duties fully and efficiently from a distance behind cover, my views are wrong, and I would not suggest that they should not do so; but while a switch entails all the elaborate details that it now does, and while the slope of a hill which may be excellent for a target at (*A*), Figure 9 may entirely preclude the attack of a target at (*C*) or (*D*); I hold that the position at (*B*) is very inferior to (*B*^{1}), from which point the

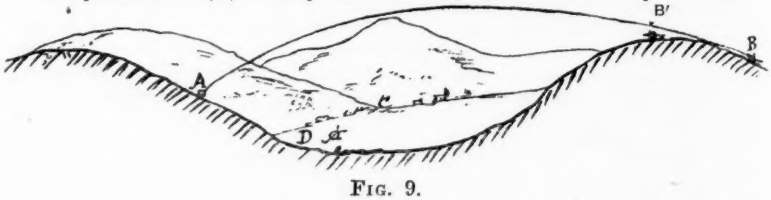


FIG. 9.

attacker can engage every possible target. The paragraph on dead ground in the Field Artillery Training seems to apply in very many cases. No amount of reconnaissance can determine every portion of

a panorama on which an enemy may set value, or to which he may find it expedient to move troops, and which, therefore, the artillery of the attack will have to engage quickly to the best of its ability.

FIG. 10.

Figure 10 illustrates the attack across a valley. The position of the attacking guns must here be very much a matter of range; in a narrow valley there may be available positions in rear of (*x*), from which they could fire, while in a wide valley it may easily be imperative to advance to (*y*) in order to engage the guns and trenches of the defender at (*D*). The attacker will doubtless find that more often than not he has only a choice of very inferior artillery positions left him, still, accidents exist on all ground, and these must be used to the best advantage by the attacker to enable him to obtain a fair field of fire while remaining at least partially concealed.

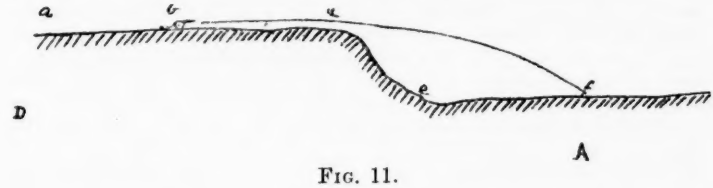


FIG. 11.

The attack on Figure 11 has certain peculiar features of its own, should the defenders select artillery positions at either (*a*) or (*b*). There is an area of ground between (*e*) and (*f*) where the guns of the attack would be in dead ground from guns at (*b*). There would, however, be no advantage in advancing the attack to this position if it were within rifle range of the defenders at (*c*); as the rifle would destroy the mobility of the attacking guns even more quickly than would the hostile guns. If (*c*) be held by artillery and infantry, the attack will have to begin at long range, and the advance will probably be very difficult beyond a point where the ground gives cover to it.

In the attack artillery fire must support the infantry until it can capture (*c*), after which it may be possible to overwhelm the guns at (*b*) or (*a*), by directing the fire of the attacking guns from an observing party with the infantry near (*c*). Such action would make the weakness of the rear position for the defence very obvious, as the defending infantry will have been driven out of (*c*) by the concentrated fire of infantry and artillery, their artillery, by reason of its position, being unable to bring its most effective, if any, fire on the attacking infantry; while the guns of the defence are then assailed by the joint attack of infantry and artillery. This really means that

the defence runs the risk of being beaten in detail by its desire to conceal its guns and save them losses.

So far I have only treated the theory of attack and defence on imaginary ground, now I propose to discuss the question of the skyline, and attempt to establish my theory with regard to that, taking an example from actual ground.

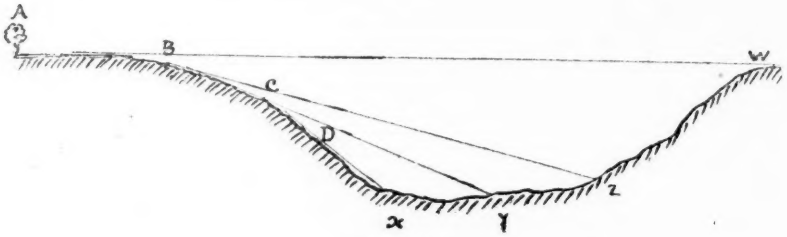


FIG. 12.

Figure 12 is the section of a hill of very ordinary type. A hedge may or may not exist at (A). It did exist on the hill from which this section is taken. Gun between (*A*) and (*B*) did not show on the skyline.

We will presume that the ridge (*A*—*B*) is being defended. The whole of the ground between (*A*) and (*D*) is on the skyline from some place between (*w*) and (*x*). Now, if the skyline be considered bad, where are you to go? It is very often impossible to go behind (*A*), even if it be otherwise advisable. If (*A*—*D*) and (*D*—*z*) be long, say 4,000 yards each, it may be necessary to be absolutely on the skyline with reference to somebody between (*w*) and (*x*), as a position behind (*A*) would give to the attacker all ground beyond (*x*), and no aimed fire can be brought from (*A*) on (*B*—*x*), unless the shape of the ground fits the trajectory. Again, it must be quite clear that the skyline is no single point in section, but is anywhere between (*A*) and (*D*), depending upon the position of the observer, which may be anywhere between (*x*) and (*w*). Further, it is maintained that it is more difficult for the attack to range on the target on the skyline than on any other possible visible target in a case as shown in Figure 12. Here from the point (*y*) the target might be anywhere between (*B*) and (*C*), as for some distance the slope of the hill is a tangent to the general curve. In such a case, at anything like a long range, it would be almost impossible to observe shorts and overs, while (*C*) would be an easy target to observe either from (*z*) or (*w*). I even maintain that a gun near (*A*) would be more difficult to range upon if it were on the skyline than if the eye were assisted by a hedge as shown. The difficulty of ranging on skylines does not apply to the flat-topped, steep-sided Aldershot hill when attacked from below, but it applies with great force when the attempt is made from a similar commanding position, say at (*w*). (Fig. 12.) On flat-topped hills, where the slope is very steep, the skyline may be approximately a point when taken in section; but even then it is not very easy to range upon, or at least to silence hostile guns, judging from the accounts of the attack of guns so placed in the Boer war. The attack, which in this case must usually be below, is unable to make any great

use of its mobility so long as the guns of the defence can be fought over the sights.

The attempt will now be made to apply the above theories to actual ground. All ground sections are produced at $\frac{1}{25,000}$; heights are three times the scale of the distances.

Figure 13 represents the trajectory of the 18-pounder, drawn to scale, with the angles of departure and descent three times the actual size, and the heights of trajectory increased in proportion. This trajectory can be reproduced on thin paper by the reader, so that it may be applied at will to any point on the sections.

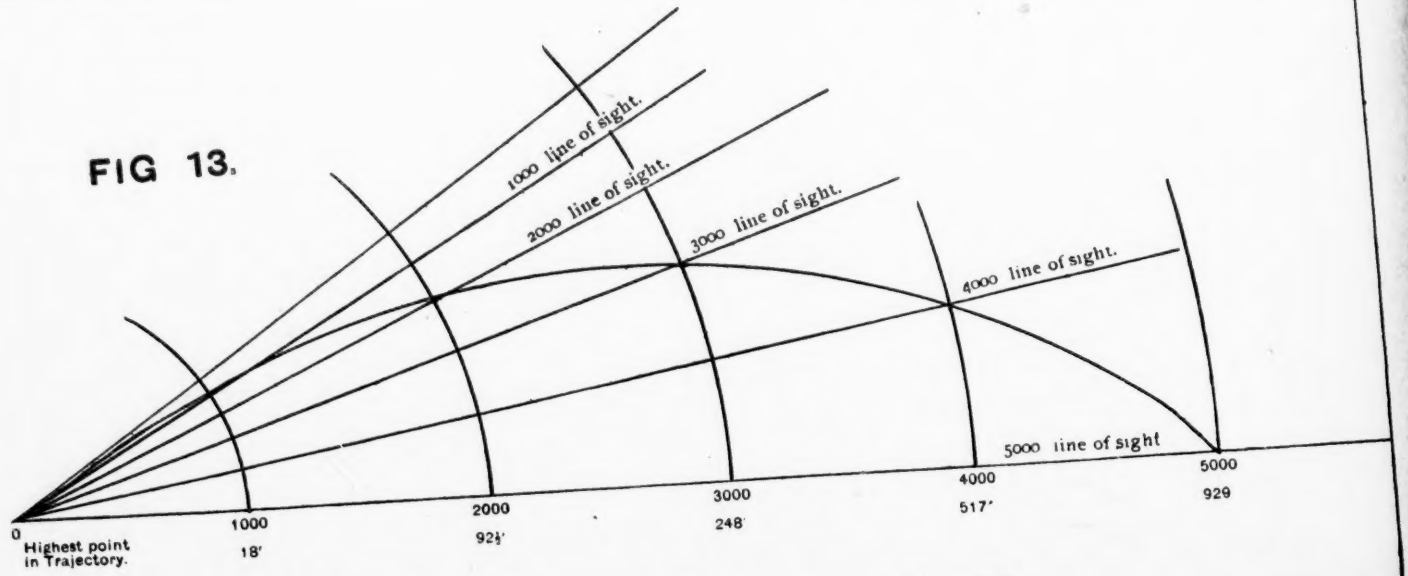
The sections of ground shown are those which are more or less familiar to students of military history and to British soldiers; any others would answer the purpose equally well. This is not, of course, a process which is applicable in the field, as the labour of drawing a good section of the ground to a scale which can be manipulated with ease is very great; but if it proves the theory generally, we may be inclined to trust the deductions for use in the field.

The first section is that of Woerth, east and west through Dieffenbach. If we presume that the attacker is on the Dieffenbach Heights, in order to reach the defenders about Elsasshausen he must advance to Dieffenbach, though there is now no reason why he should advance down the slope to where the German guns actually stood early in the battle. Ammunition supply would be easier near Dieffenbach than in an advanced position. If the defence were to place its guns in the hollow to the north of Elsasshausen, if we apply the trajectory of the gun to the ground we see that they could engage attacking guns at Dieffenbach, but could not bring fire to bear on anyone on the right bank of the Sauer.

In the second section, if the guns of the attack were to the west of Gravelotte, they could doubtless engage defending guns at Point-du-Jour, and even be in a better position to search the hollow of Chalet St. Germain than if further advanced; but if thus retired, can anybody believe that they could have had the influence on the fight which raged in front of St. Hubert that the German guns actually had? From whence in such a country are battery commanders to direct their fire if the guns be retired from where they can view the battle-field? If from trees, houses, or ladders, there seems certainly very little reason to expect that the fire will be quickly turned and concentrated on the counter attacks or rapid movements of the enemy. On the side of the defence, guns could now not be retired far behind Point-du-Jour and still take an active part in the battle. The nearer the crest they are, the better they can fulfil their duties of always being ready to assist in the contest without being the whole time exposed to a vastly superior artillery fire. Any considerable retirement from the crest would leave the attack, when pushed forward, exposed only to infantry fire, unsupported by the guns.

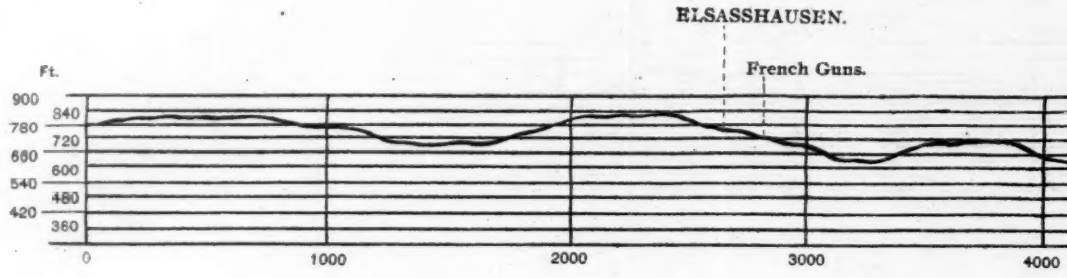
The third section, St. Privat—St. Marie aux Chênes, shows that in such country, if the defence takes the crest the attack is exposed to fire at extreme ranges. Through such fire he might move rapidly with little loss if the fire were indirect; but in an advance under direct fire, unless all practice lies, the horses would be destroyed before the guns reached a point 4,000 yards from their objective; the guns, being immobile, would soon be without ammunition. The effect would be the same as at Colenso, where guns, hurriedly advanced, got into the zone of infantry fire before that had been seriously engaged.

FIG 13.

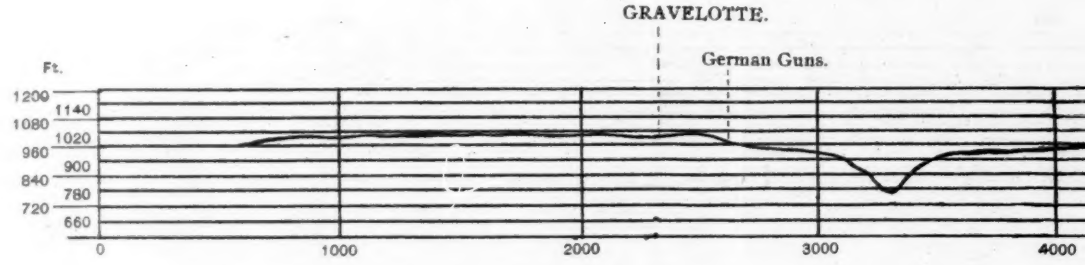


The trajectory of 18-pr. gun at a scale of ~~$\frac{1}{15000}$~~ heights exaggerated three times.

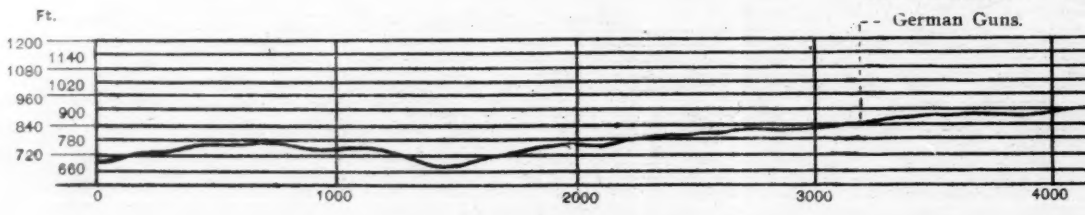
I.—Section of the Bat



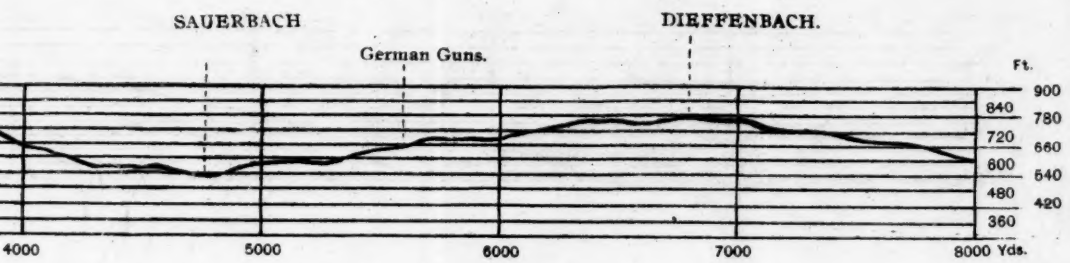
II.—Section through Grav



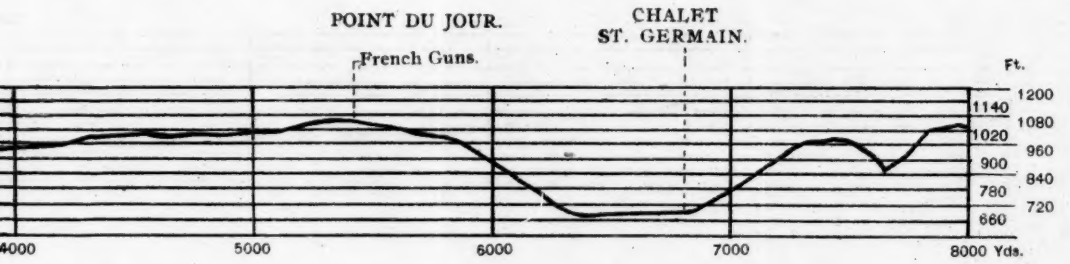
III.—Section through St. Privat



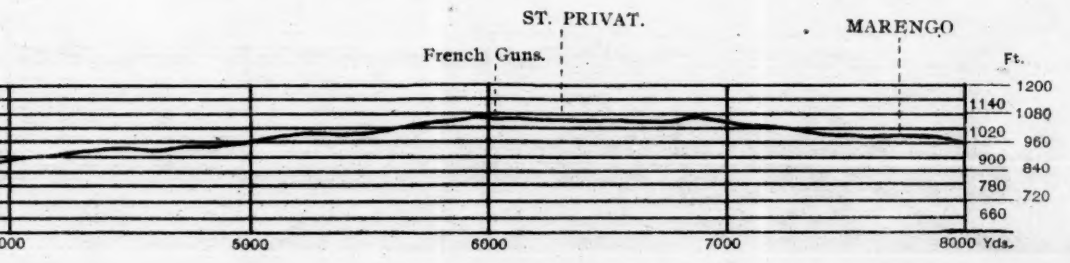
Battlefield of Woerth.



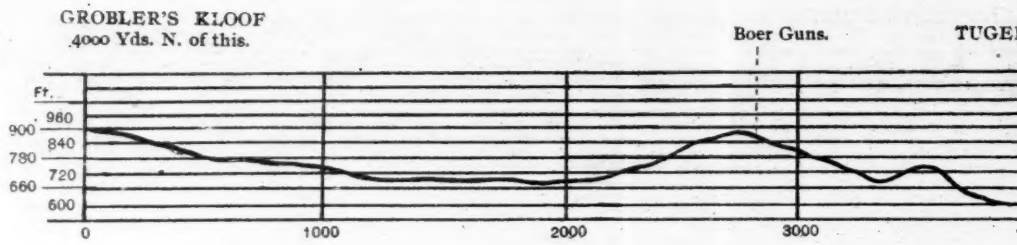
ravelotte and Point du Jour.



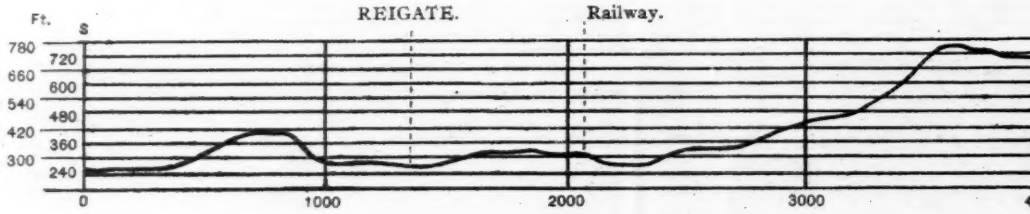
vat and Ste. Marie aux Chenes.



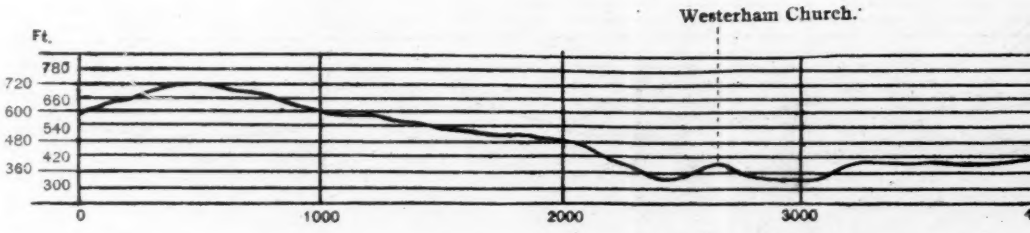
IV.—Section of Colenso through



V.—Section N. &

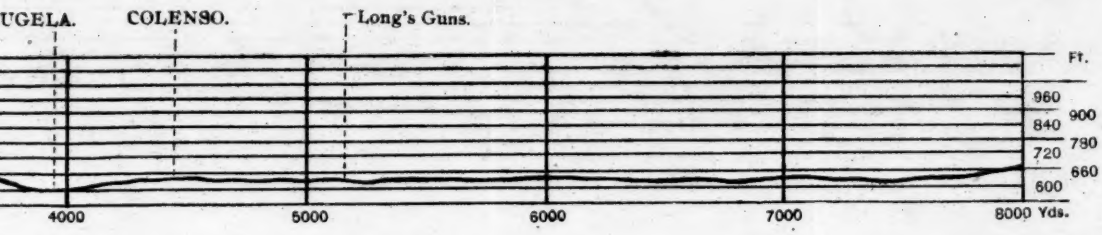


VI.—Section NNE. and SSW



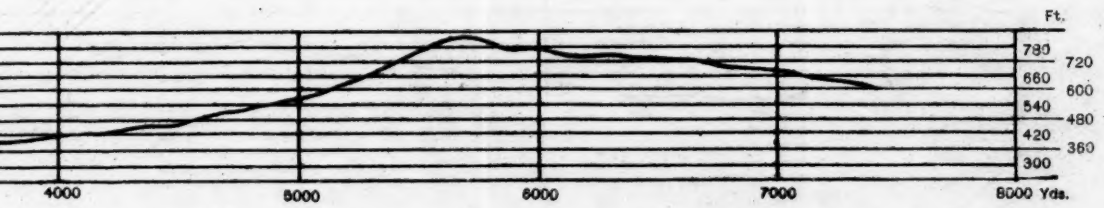
All the above sections are at a scale of

gh Long's Guns and the Railway Bridge.



. & S. through Reigate.

SW. through Westerham Church.



ale of $\frac{1}{11000}$ the heights are exaggerated three times.

& Co., Limited, London.

The section of Colenso shows that the attack advanced down a slope similar to that of St. Privat against a broken and commanding position. It is impossible to show Grobler's Kloof on the section, as it is 4,000 yards north of the last part shown.

The section (*N*) and (*S*) through Reigate is, curiously, similar to Figures 6 and 11. I think that the application of the trajectory of the 18-pounder to this section will show that there is really something to be said for the theory in favour of the crest, as in such a case it is the only position from which the defender can carry on a contest with any hope of success or of checking the advance, by reason of the losses he is likely to inflict on the enemy.

The section through Westerham is chiefly interesting as an example of the number of places which in turn become the skyline. If the reader will go to Westerham Church and then advance either NNW., N., or NNE., he will have to breast a hill, and will find that the skyline never remains in the same field for more than a few hundred yards of his advance. This exercise can be followed in any country where there are hills and valleys of any considerable size. I think that anyone who has done this will for the future avoid criticising a position as being on the skyline.

It is regretted that it is impossible to produce sections of the battles in Manchuria, where the Russians claim to have done so much from positions behind the crest. The maps, however, do not give the heights or the exact positions of the guns. The accounts of the Russian batteries which fired all day and lost three horses when in a secluded position may be believed; but it is rather hard to believe that those batteries were much more use to the Russian army than if they had remained in Siberia and fired off their ammunition into Lake Baikal. It is quite certain that the Japanese were not defeated by these tactics, and when we consider the numbers engaged, and remember that the Japanese were always on the offensive, it is obvious that this artillery fire was not more destructive than the rest of the Russian fire. To remain in action all day and fire off thousands of rounds over a hill is not an object in itself, even if you only lose three horses; what is required is victory, even if obtained at some expense, by the artillery. A victor will always have to face loss. I have not found that the Japanese used this kind of fire except in siege or semi-siege operations, when, of course, the case is quite different. But what happened in this war does not really influence my theory, as neither side had regular shields.

My plea for the crest position, not necessarily visible to the attack, is that it is the most generally useful, as, on the whole, from thence the best view of the entire situation is obtained, and the guns can most rapidly be turned on whatever may appear, while the contour of the ground cannot prevent the trajectory of the gun reaching any given spot.

When the shells of shielded artillery can destroy at once the guns opposed to them, on which they can range, those who advocate the retired position will have perhaps the best of the argument; even then I believe artillery will have to face loss to secure victory, and until this happens I am thoroughly convinced that quick-firing shielded artillery guns—not howitzers—should use their most effective fire, as well as the protection of their shields, and stand up to any necessary loss

THE VON LÖBELL ANNUAL REPORTS ON THE CHANGES AND PROGRESS IN MILITARY MATTERS IN 1905.

Précis from the German by LIEUT.-COLONEL E. GUNTER, *p.s.c.*, (*late*) *East Lancashire Regiment.*

Continued from the November JOURNAL, p. 1400.

PERMANENT FORTIFICATION, 1905.

The Report bewails the little attention paid to siege work in Germany, and says there is something to learn, though Port Arthur brought to light no new experience in the art of siege warfare. It has long chapters on fortress warfare, the investment, the artillery, and close attacks, etc., and another on the defence on various constructions, etc., which is worth study, as it deals with the defence of Port Arthur, the use of advanced positions, outworks, etc. Then it proceeds to

3.—THE PROGRESS OF PERMANENT FORTIFICATION IN 1905.

Austria-Hungary.—A new mole is to be constructed at Pola, compelling all foreign ships in war to enter the harbour from the north by the Fassana channel, exposed to the fire of the inland forts, while the home vessels can enter from the south by a swing-bridge arrangement, combined with a sort of bridge-head construction. Both the mole and its supporting point on land are to be fortified.

Belgium.—The completion of the girdle of forts in the Nethe-Rupel line and the pushing forward of the enceinte is being considered, but as the work has made but little progress, it may be an age before it is completed.

The Meuse defences, hitherto dependent on field guns for their artillery defence have now been strengthened by the addition of 8·7–cm. (3·43-inch) howitzers. Search-lights have also been provided.

Denmark.—The Little Belt at Middlefort is to be defended by armoured batteries. Nothing further has transpired as to the defences of the Great Belt at Korsör.

Though there is a party in the Chamber which strongly urges the defence of Copenhagen from the land side, this has not yet been taken in hand.

France.—The question of the defence of the Eastern frontier by fortresses is still being discussed. It is considered indispensable to bring Toul, Verdun, Epinal, and Belfort up to modern requirements, and to put in order those on the Alpine border, as well as the coast defences. Verdun is already in hand. Major Immanuel, examining the question in the *Kriegstechnische Zeitschrift*, No. 10, says it would require 6 or 7 army corps to garrison all the great fortresses. Still, it would be a mistake to underestimate their utility, and their capture would involve in each case thoroughly trained and technically equipped forces. At Brest the construction and armament of the Central Réduit at St. Michel on the island Quessant are being actively proceeded with. Heavy guns are mounted in armoured turrets, and it is to be garrisoned by a company of Colonial Infantry. The Northern Defences of Brest are being re-armed with modern 240-mm. (9·5-inch) guns, and the older works are to be modernised.

Germany.—Excepting a few general remarks noted in the preamble the Report is silent as to any permanent fortification work in Germany.

Great Britain.—According to Captain Stavenhagen, the breakwater sheltering Portland Harbour from the north has been completed. The fort crowning the head of the North Mole is still in construction, and the old fortifications are being re-armed with modern guns. At Esquimalt (Vancouver), in place of the old fort, new defences to protect Vancouver and Victoria are to be erected.

Italy.—The Tyrol border is being strengthened by a number of new posts, and in the interior old works are being replaced by new. A new fort like that on Mount Rocco (Pieve di Cadore) is being erected on the Col Piccolo to command the route by the Auronzo Vale to the Valley of the Piave. On the other hand, the western enceinte of Piacenza is being levelled, and the forts at Pastrengo are being sold.

Switzerland.—Land mines are being prepared to close the Simplon Tunnel, now approaching completion, in case of necessity. The total cost is estimated at 890,000 francs (£35,400).

United States.—The Report gives a short account of the coast defences and their improvement for San Francisco, New Orleans, Charleston, Chesapeake Bay, Hampton Roads, Baltimore, Philadelphia, New York, Long Island, Boston, etc., taken from the *Kriegstechnische Zeitschrift*, Nos. 2, 3, and 4, to which the reader is referred for details, and gives a list of works dealing with Port Arthur and its lessons, chiefly published in Germany. Captain Stavenhagen published in the *Schweizer Militärische Blätter* in May his conclusions.

ARTILLERY MATÉRIEL IN 1905.

The re-armament of the artillery, which means practically the adoption of the barrel-recoiling Q.F. field gun, made considerably greater progress in 1905 than in 1904. The shield question is still in part the subject of discussion and experiment, but on the whole may be considered decided, since Russia has, notwithstanding their weight, adopted them for their 1902 guns. The Japanese made use of shields for the close attack on Port Arthur. How to combat the shield is still a matter of experiment with artillerists. The old question of shrapnel and common again crops up. A sort of general utility shell is again being discussed. The idea of an armoured

motor Q.F. field gun has also been started, and experiments are being made with this in Austria and England.

Austria-Hungary.—The year 1905 brought with it the long desired solution of the field gun question, which has been really pending since 1892. The following details are given.† It has the flat wedge breech-closing action:—

Calibre, 7·69-cm. (3·03-inch).
Weight of gun, 336 kilos. (7·6 cwt.).
Weight of unlimbered gun with shield, 950 kilos. (19·9 cwt.).
3 mm. (·12 in.) thick steel.
Ammunition wagon, 1,780 kilos. (35·4 cwt.).
Weight of shrapnel shell, 6·7 kilos. (14¾ lbs.).
Weight of common shell—a trifle less.
Weight of shrapnel bullets, 9 grammes (·32 ounce).
Height fired over, 99 cm. (3¼ feet).
Track of wheels, 1·60 m. (5¼ feet).

The Field Artillery is organised in regiments of 2 divisions (brigades), each of 3 batteries, each having 6 guns and 9 ammunition wagons.

Belgium.—As reported last year†† it was almost certain that the result of the Q.F. field gun trials would end in favour of the Krupp gun. This has occurred. This gun was described in *La Belgique Militaire*.

The exhibition at Liege would have convinced any person having a doubt on the subject of the necessity for re-armament. The foreign rival competitors had their guns placed beside the old Belgian ones, so the contrast was striking, and indicated how much the latter fell behind the requirements of to-day. The Belgian Government must have been impressed, for they are demanding a credit of 30 millions (£1,200,000) for new guns, of which, however, part will be spent in Belgium, for, by agreement, parts of the guns are to be manufactured in Belgium workshops, etc.

Forty-six millions are also to be voted for the reconstruction and re-armament of Antwerp and other fortresses, of which doubtless the greater part will be spent on artillery *matériel*.

Bulgaria.—Of the 81 Schneider-Creusot 4-gun Field Batteries mentioned in last year's Report, 9 batteries were to be finished by May, 1906, 27 batteries in December, and the remaining 45 in July, 1907. The unlimbered gun, with its 4-mm. (·16-inch) thick steel shields, weighs about 20¼ cwt.; its shrapnel weighs about 14·3 lbs.; its muzzle velocity about 1,650 f.s. It will be decided when the guns are delivered whether to form 4-gun or 6-gun batteries.

China.—The artillery armament of the reorganised Chinese Army,††† which is divided into six divisions at present, and

†See the JOURNAL for December, 1905, p. 1404, for the new Austrian mountain gun.—E.G.

††See the JOURNAL for December, 1905, p. 1405.—E.G.

†††An account of the Chinese Army, by General H. N. Frey, was published in the JOURNAL for November, 1903, p. 1270, and continued in two subsequent numbers. Also see Military Notes, JOURNAL, December, 1905, p. 1459.—E.G.

of which a seventh is shortly to be formed, is given. The first two divisions have 64 Japanese guns, probably of the Arisaka pattern, but certainly not barrel-recoiling Q.F. field guns; 44 more guns are on order, so each division will shortly have 36 field guns of Japanese make. The 3rd Chinese Division has 24 field guns and 18 mountain guns of Krupp make, and the 4th will shortly be similarly equipped. The 5th and 6th Divisions are equipped with the older pattern Krupp field guns, and the 7th Division is to be provided, when formed, with the French 36 field and 18 mountain guns, ordered from the Creusot firm. The Viceroys of Nankin and Kai fong fu have also commenced arming their forces with Krupp guns.† The idea of the Chinese manufacturing their own field guns remains for the present a pious hope only

France.—Progress in artillery *matériel* was made in 1905, but not much is known with regard to the new light howitzer.†† It is intended to fire common shell only, while the Q.F. field guns are only to fire shrapnel. The H.A. batteries are not yet armed with modern guns, but an order has been given for the manufacture at Bourges of a 7-cm. (2·75-inch) barrel-recoiling Q.F. gun for them. It is not certain whether the new mountain guns†† will be of the 68-mm. (2·68-inch) or the 120-mm. (4·7-inch) calibre. Great attention is being paid to the question of heavy artillery. Experiments were made at Bourges with a new gun of 155-mm. (6·1-inch) calibre, but details of this are kept quite secret.

Great Britain.—The details of the new Q.F. field guns, Mark I., are given§ in the minutest detail, even to the number of bullets in the shrapnel, weight of powder charge, etc., for both F.A. and H.A. The weight of the 18-pounder, in comparison to its muzzle velocity, is commented on, and a number of technical details criticised, for which there is no space here. The number of available guns in Great Britain and in India is given. It is stated that the new mountain gun* will be a Maxim-Nordenfeldt 7·5-cm. (2·95-inch) gun, weighing 107 kilos. (2·1 cwt.). The new Heavy Artillery gun is not mentioned.

Holland.—During 1905 the Q.F. field guns ordered of Krupp have been steadily delivered. The gun is 7·5-cm. (2·95-inch) calibre and weighs 350 kilos. (about 6·9 cwt.). It is time-fused to 6,094 yards, and has a muzzle velocity of 1,635 f.s. It is said to be capable of firing 20 rounds a minute. It has 4-mm. steel shields on gun and ammunition wagon. When completely armed, the batteries are to have 6 guns and 9 ammunition wagons, 1 baggage, 1 technical, 1 supply, and 1 forage wagon.

Russia.—The Report has a few remarks to make about the Russian guns used in the war, which were, however, mostly of old

†Krupps' agents abroad are always active in pushing their guns in China and elsewhere, but Ehrhardt's are also offering, so there is good competition.—E.G.

††See last year's Report in the JOURNAL for December, 1905, p. 1405.—E.G.

§Published in the JOURNAL for March, 1905, p. 326.—E.G.

* The new 10-pounder Jointed B.L. mountain gun is meant. I fear it is a good deal heavier than here assumed.—E.G.

pattern, and nothing new is brought to light. Some details of the new mountain gun are given, the calibre of which is given as 7·62 cm. (3 inches).

Switzerland.—Further details are given of the New Swiss (Krupp) Q.F. field gun with protective steel shields 4·25-mm. (·17-inch) thick.†

It is almost certain, though not finally decided, that the 12-cm. (4·7-inch) Krupp howitzer will be chosen for the heavy artillery. It is intended to adopt a mountain gun of 1906 pattern in the year 1906-7. Probably a Krupp will be selected.

Turkey.—The following batteries of artillery (6 guns each) have been ordered from Krupp: — 62 field guns, 7·5-cm. (2·96-inch); 23 mountain guns, 7·5-cm.; 3 howitzers, 15-cm. (5·9-inch); 3 siege guns, 10·5-cm. (4·13-inch); total, 91 batteries = 546 guns.

United States.—About 1,200 guns (quick-firers and others) and heavy mortars of various calibres, ranging from 12-inch down to 3-inch, have been delivered towards completion of the re-armament. A new 3-pounder machine gun has been tried which is said to fire 300 rounds a minute, and to have a very practical barrel-cooling arrangement.

SMALL ARMS IN 1905.

The reports sent in by Army surgeons from the late seat of war all speak favourably of the small-bore 6·5-mm. (·256-inch) rifle used by the Japanese as a *humane* weapon. Dr. Körting, of the Prussian Service, attached to the Russian Army, and Dr. Wreden, surgeon-in-chief of the Russian Army, have reported exhaustively as to the nature of the wounds inflicted by this arm, which only inflicts very severe and fatal wounds at the closer ranges. Yet the numbers placed *hors de combat* for the time were considerable. Only about 15 per cent. of the losses were inflicted by artillery fire.

The Russians suffered much for want of a good range-finder. The Souchier proved too complicated. It was seldom possible to pick up the range from the artillery as the guns were generally too far off. The judging distance by eye was very defective. A new handy range-finder,†† sold by M. Hensoldt & Sons, opticians, Wetzlar, for M. 20 is well spoken of in the *Militär-Wochenblatt*, No. 113, of 1905, for distances up to 3,000 metres.

Denmark.—The *Rekyl* or recoil gun mentioned in last year's Report, only weighs 8 kilos. (17½ lbs.), so it can easily be carried by one man either on foot or on horseback, so that at a distance this machine gun section looks like an ordinary cavalry patrol. The action is extremely simple. The magazine holds 25 rounds, and firing can begin as soon as these are brought up into the barrel. By pressure on the trigger the firing is continued; but it can also be used as a single-loader. The recoil sets the action going. A forked rest hangs below the muzzle as a support when firing; when carried it fits

†These do not materially differ from those given in the JOURNAL for October, 1904, p. 1150.—E.G.

††This is a small prism range-finder like the well-known Weldon Range-finder.—E.G.

up under the barrel. The pack-saddle holds 96 clips, each containing 25 rounds = 2,400 rounds altogether. It weighs 122 kilos, (268½ lbs.). Each firer can also carry 200—300 rounds.

France.—The *Armée Territoriale* says a new infantry rifle is at length decided on. It is said to be a 6·7-mm. (·264-inch) automatic rifle. This is quite possible, for we know that in France experiments have been made for some years past with automatic rifles.† It is doubtful whether these will fully satisfy war requirements. The new rifle is said to be shorter than the Lebel. The bullet is like the lately introduced Lebel D bullet. It has no outer covering, which it was found stripped and injured the rifling. Its accuracy and the flatness of its trajectory, range, etc., are, according to French accounts, beyond anything yet invented. They, however give no details.

Great Britain.—The Report reproduces the debate in the House of Lords on the 24th February, 1905, on the new short rifle, and the details reported by Captain Johnson, of the Rifle Brigade.†† The Report also describes Kinlock's "Axite" (improved cordite powder) at some length.

Germany.—The Report speaks most highly of the performances of the new "S" bullet, especially with the new powder. Its penetration into fir at 100 metres distance is said to be 3 feet 3 inches; at 400 metres, 2 feet 7½ inches; at 800, 14 inches; at 300 metres, ·27 inch thickness of iron was penetrated. Great attention is being paid to the quiet "squeeze" which it is necessary to give the trigger to ensure accurate shooting. A little indicator, the invention of a Major v. Tschammer, is easily attached to the rifle, and shows if the trigger has been properly pressed or not.

Sweden.—The Swedish infantry is armed with the Mauser 6·5-mm. (·256-inch) rifle of 1896, and the cavalry with a similar carbine. Trials have been proceeding with steel bullets, having a copper covering. They had a greater initial velocity than the ordinary bullets. They penetrated further into steel plates, but less into dry fir.

Experiments were made with the Barr and Stroud and Zeiss range-finders. The former were, on the whole, more successful, but neither were definitely adopted for infantry, and further trials are ordered.

United States.—The reports of the officers attached to the belligerent armies in the late Russo-Japanese war have led to the cessation for the present of any further manufacture of the new Springfield. Among other things, the length of the bayonet has been much discussed, as the projected shortening of the barrel might put the soldier at a disadvantage with a longer-reaching opponent. The Navy are also to be armed with the Springfield new rifle when it is ready.

---

†See the JOURNAL for October, 1902, p. 1318, and October, 1903, p. 1149.—E.G.

††The *Times* of the 6th February, 1905, is probably meant. Since then many of the defects pointed out have been remedied. But several officers of experience still favour the long rifle for infantry, and the short rifle of the same calibre for mounted troops. Recent reports from the Guards speak well of the new rifle.—E.G.

MILITARY COMMUNICATIONS IN 1905.

1. War Balloons, 1905.—Since our reports of ballooning in 1903† considerable progress has been made. Motor air-ships will have to be reckoned with in future wars, though both the Japanese and Russians could not make use of even ordinary captive balloons in the late war owing to their being so behindhand in their preparations in this respect.

France.—A special Laboratory was established in 1904 for study of and experiments with war balloons, under the late talented Colonel Renard as director, which is being carried on by his successor and staff.

Germany.—In Germany the kite balloon has been adopted, as in most great States, which, with the exception of England, have given up the old globular form. Belgium, France, Japan, Roumania, Russia, and the United States have adopted the kite balloon. England, while retaining its old goldbeater skin globular balloon has, in consequence of the failure of this in a heavy wind, added to its balloon companies Cody kite sections. The late war has shown that it is impracticable to make use of portable gas under certain circumstances in war, so it is better to depend on gas made on the spot. The Russians made hydrogen gas in a new peculiar way. But even this method is dependent on a good water supply.

At the St. Louis Exhibition a new apparatus for the manufacture of hydrogen gas, the invention of a Mr. Lane, an Englishman, was shown. This made the gas very cheaply. It is made out of inferior coal, brown coal, turf, etc., which produces first a heavy impure gas; but this is afterwards separated and refined in a peculiar stove so that there results an almost pure hydrogen gas. It did not give quite satisfactory results at St. Louis, but the inventor has since perfected it. If it now really works well, the apparatus will be of great value, especially in fortresses, as it will enable refuse coal to be made use of and lighting gas to be dispensed with for filling balloons.

The motive power of modern air-ships has hitherto been wind or steam. This is unsuited to field work, and so is only used in Germany and other States in fortresses. The substitutes are sufficient for the ascent and transport of the field balloons, but are not powerful enough to cause a balloon to descend quickly in a strong wind, which in the case of a captive balloon fired at by artillery is of great importance for its safety. Benzine motors of great power, quick movement, and yet light in weight have been tried and with some success by a German firm.

Motor Air-Ships.—Juillot's "*Lebaudy*" airship, of which a description was given in Vol. XXX. of the Reports,†† has been further improved since then. Official trials were held in July, 1905, in view of testing its military use. On the 3rd it travelled 60 miles at a rate of 24 miles an hour, and returned to its starting point and was securely anchored in a field for the night. A few days later it travelled 61 miles at 18½ miles an hour. On the 10th November

†See the JOURNAL for October, 1904, p. 1153.—E.G.

††See the JOURNAL for October, 1904, p. 1154, for these details. It has since been enlarged.—E.G.

it was manœuvred at a height of 1,493 yards in the air with satisfactory results.

The Zeppelin air-ship, which is of rigid construction, was again tried in November, 1905, but owing to an accident at starting to its steering gear, no conclusions resulted. It was again tried after being repaired in January, 1906. The giant air-ship was then completely shattered and destroyed, so the victory remains for the present with the pliant air-ships.

Military Photography.—The Report goes briefly into the progress made in photography as an aid to reconnaissance and military sketching. It mentions an apparatus, patented by the Véga Co., of Geneva, which was successfully tried by the Japanese in the late war.

The use of pigeons with war balloons to send back photographs, etc., has made good progress in most countries. The method of training pigeons for this must be quite different from that ordinarily followed with homing pigeons.

Wireless-Telegraphy.—At cavalry manœuvres on the eastern frontiers of Germany, trials took place. The wagons were able to accompany the advanced squadrons even along bad roads, and signalling was successfully carried on up to 62 miles. Cipher aerograms were used, and not much loss of time was thereby entailed. The Report gives copious details of the experiences of the Germans in S.W. Africa with their Braun-Siemens apparatus in 1904-05. It met with many difficulties of transport, etc., but the conclusion was that, provided the operators were thoroughly trained and experienced, it is invaluable out there. Powerful transmitters are best. The Report gives some details of the use of wireless telegraphy in the late Russo-Japanese war. The Russians began their preparations too late, and the Japanese arrangements have been kept secret. In France, considerable progress has been made. E. Nesper's "*Drahtlose Telegraphie*," published by Springer, of Berlin, is recommended.

(*To be continued.*)

A COMPANY OF RUSSIAN MACHINE GUNS AT THE BATTLE OF LIAO-YANG.[1]

Translated from the *Revue d'Artillerie*, January, 1905, by Lieut.-Colonel W. D. Bird, D.S.O., Professor, Indian Staff College, Quetta.

MOST soldiers are anxiously awaiting the solution of the difficult problem of the best method of employing machine guns in modern warfare, and much has been written and spoken on this subject. Unfortunately, sufficient war experience is not yet available from which to form definite conclusions, for from campaigns such as those which have been recently fought in Cuba and South Africa, where the attendant circumstances differed very widely from those of a European war, none can be drawn. The Russo-Japanese War, now raging in the Far East, is, however, on a different footing. Here the conditions approximate to those which would obtain in Europe, and from careful study of the actions of the combatants, valuable lessons should be learnt. To this end, therefore, a translation has been made of the account of the experiences of a company of Russian machine guns, contributed to the *Ruskii Invalid* by an officer of the company, and worthy of close consideration. (Note by Editor of the *Revue d'Artillerie*):—

"Winter has set its iron hand on the face of Manchuria, and for the moment has put an end to active operations, the monotony of camp life being hardly relieved from time to time by some thrilling tale of daring raid on the enemy's outposts. Our own camp at the village of Fou Lin is, however, situated far in rear of the front of the army, and lies in full view of the tombs of the Manchu Emperors. Here the short winter days pass busily enough, but in the long evenings time hangs heavily on our hands, the difficulty being to find occupation for the mind. Papers we read, and read again, full of descriptions of our operations, and one evening, when so engaged, it struck me that no account had, so far as I was aware, yet been published regarding the actions of machine guns in the present campaign. I therefore determined to write a brief description of the experiences of my machine gun company, both during the journey to the front and in three subsequent actions. My company quitted the town of O——— with all the usual accompaniments of departure for active service—champagne, toasts, and tears—and I was glad when at last we all, 2 officers and 34 men, with guns and equipment complete, but short of horses, were safely in the train and running eastwards. Once on our way we soon settled down, and then, as there was nothing to do but arrange for the food of my command, I had ample leisure to look about me and speculate on what the

[1] This paper is somewhat late, but has been printed by special request.

future had in store. Of all the subjects that kept crossing my brain—the homes we left behind, the enemy to be encountered in front—the one uppermost in my thoughts was, where shall we receive our proper complement of officers and men, and when shall we be given time to work together and attain cohesion? Headquarters I vaguely knew were at Liao Yang; but dismissed at once the idea that our establishment would be completed at this place, for such a course would have been tantamount to sending us direct into the line of battle, for which we could not possibly be fit. The problem, however, remained unsolved, and throughout the long journey, it weighed on my mind, for I had spent three years in studying machine guns, and believing myself proficient in their use, was, and am still convinced that the requisite skill and knowledge cannot be acquired in a shorter time. I knew, therefore, that wherever we received the 3 officers and 67 men necessary to complete our establishment, they would be quite raw, and with little or no knowledge of our special *rôle* in action. Against these convictions it may, of course, be argued that there are the text books and regulations, but to this I reply that even their existence is not generally known. For instance, I can state as a fact that, in August, I asked a cavalry commanding officer, who had been in several actions in Southern Manchuria, whether my guns would be of any service in enabling cavalry to combine its own rapidity of movement with the fire-power of infantry, and, at the same time, offered him my highly-trained layers. To this he replied:—'Machine guns are only useful as employed by the Japanese; and even they have still a good deal to learn about their handling. We don't want layers, our troopers know how to fire their rifles, and we are equally competent to train our own machine gun detachments.'

"On another occasion a colleague, also commanding a machine gun company, was discussing with me the tools and labour required to excavate pits for our guns, when we came to the conclusion that to make trenches for 8 machine guns would occupy 120 men, with 60 large shovels, from five to six hours, according to the nature of the ground. Whereas, each company possesses only eight shovels, and each number one has under his orders a machine gun, a horse, and a cart, which are not easily accommodated, but he unfortunately also carries a rifle and bayonet. It is clear, therefore, that the characteristics and necessities of machine guns are by no means at present fully understood. One thing, moreover, is certain, that a definite decision must be given regarding the organisation of machine guns.

"Two courses are open: they can either be grouped as a special arm of the service; or one or more guns may form an integral part of each regiment. My own opinion is, that the experience of the present war will prove that machine guns should be regarded as a new and distinct arm.

"This is not, however, the time to speculate as to the future of machine guns, and I shall therefore confine myself to describing the part taken by my company in the battle of Liao Yang, on 30th and 31st August, 1904.

NOTE.—A company should comprise 8 machine guns, with a *personnel* of 95 officers and men, with 56 horses, if the guns are mounted on carriages; if on tripods, with pack transport, of 119 officers and men, with 56 horses.

"We received our baptism of artillery fire on 11th August, at Da-tchi-chao, where men and horses were for 15 hours exposed to a cross fire. Our losses were small, amounting to only 2 men and 1 horse wounded, but it was a trying ordeal, and that we all fully realised the very unpleasant sensation of being obliged to remain passive under fire.

"On 29th August, the company was ordered by the general officer commanding the division to which it was attached, to move to the right of the position, where it occupied the southern border of the village of Goutsiatsy, on the night of 29th-30th August. The ground in our vicinity was generally level, and covered with a tall crop of millet, which had been cleared for a distance of 900 paces (about 700 yards).

"Four hundred paces to our left lay the railway embankment; to the left rear were the heights of the main position; in front of these was situated the village of Maietoun, to the south of which were two small hills distant from us some two versts (1¼ miles).

"These hills and the village of Maietoun were held by the —— Regiment.

"A little more than two versts (about 1¼ miles) to the front stood the village of Besymiannoi, and three versts (about 2 miles) away the village of Datchjaotsiatsoi was just visible.

"At 8 a.m. on 17th, the Frontier Guards, supported by two companies of the —— Regiment, placed on the embankment, came into collision with the enemy's advanced troops, near the southernmost hill, where a brief skirmish occurred. About 10 a.m. the Japanese were apparently reinforced, some horsemen appearing near the railway, who, as soon as they came under fire, plunged into the millet to the west of the line, where, however, their movements were easily visible. Attention being thus attracted to this direction, we observed, at a point about 1,250 to 1,300 paces (about 1,000 yards) from our position, where the millet grew less thickly, a considerable body of cavalry, escorting some pack animals and footmen. These I eventually made out to be a mountain battery, seemingly endeavouring, under cover of the crops, to gain a position from which they could take in reverse the two hills occupied by two battalions of the —— Regiment.

"Such an opportunity was not to be lost. There was no time for ranging, so fire was at once commenced, the first gun opening at 1,200 paces, the remainder, in succession, each employing an elevation greater by 25 paces, *e.g.*, No. 2 gun 1,225 paces, No. 3 gun 1,250 paces, and so on. The effect was instantaneous, for the battery at once attempted to diverge to its right to gain cover from view where the millet grew more thickly. But it was too late, and long before the remnants of the battery disappeared from view, we could see that it had been completely disorganised. The company fired 6,000 rounds, in all, in 1½ minutes, but the occasion justified this expenditure of ammunition.

"For two hours nothing occurred, even the report of the guns, which occasionally threw a shell in our direction, being lost in the noise of the battle raging on our left.

"About noon, however, men were observed making their way along the railway line, with the apparent intention of creeping forward to the embankment and taking our soldiers in reverse. To check this movement, rapid traversing fire was opened six times, several elevations being employed on each occasion, a course rendered

necessary by the fact that the Japanese kept advancing man by man from different points.

"The enemy's attempts in this direction having been defeated, the Japanese undertook a regular attack against our position, advancing in lines of skirmishers; but in spite of repeated endeavours, were unable, until nightfall, to make substantial progress beyond the standing millet.

"With the approach of darkness we could no longer shoot with effect, and the Japanese skirmishers were therefore enabled to close to decisive range, and maintain during the night an uninterrupted fusilade, which kept us awake, but caused few casualties. At daybreak we fired a belt to clear the border of the millet of any sharpshooters who might be lurking there, and this silenced the enemy for half-an-hour. Subsequently, however, a dropping fire commenced, warning us of the presence of a small body of Japanese, who must have crept unobserved to the edge of the area cleared of crops, and soon to show a head, hand, or pair of glasses, above our parapet, at once attracted a hail of bullets, which came whistling overhead.

"These skirmishers eventually caused so much annoyance that a non-commissioned officer volunteered to sally out with 15 men taken from the horse-holders and orderlies, and drive them off. Seeing the Russians advance, the Japanese, about 25 in number, under an officer, at once came forward to meet them.

"The Japanese officer on being charged by Private Ch———, threw down his sword, and taking his revolver, wounded him in the foot, but was at once bayonetted by another private, whilst two of his comrades helped the wounded man back to cover. In the meantime Sergeant S——— killed three Japanese with his bayonet, but being unfortunately unable to withdraw it from the body of his third adversary, was shot dead by a fourth, who was, however, at once killed by Private A———, all five bodies falling in one heap. When this brief bayonet fight was ended not a living Japanese remained to our front, and not another shot was fired until 2 p.m. After collecting our trophies—an officer's sword, rifles, etc.—we were therefore afforded an opportunity for a short rest, and a frugal meal of biscuits and water. At about 3 p.m. a group of Japanese was observed near a culvert on the railway line, one of whom was signalling with a yellow flag. This signalling continued for quite an hour, in spite of the efforts of our sharpshooters, the range, 1,500 paces (about 1,150 yards), being too great for accurate individual practice. I then gave orders to number 4 Section to clear the culvert, and its commander, choosing a favourable moment, just as two Japanese with flags came from under the little bridge, opened rapid fire, his first gun using an elevation of 1,450 paces, his second one of 1,500 paces, with the result that there was no more signalling that day.

"About 5 p.m. bodies of the enemy's skirmishers were observed moving through the millet in the direction of the village of Baitsailiaogouavo, in order to turn our right flank where the crops had been left standing, and to check these troops rapid fire was maintained at frequent intervals on a road leading through the fields towards the village of Datchjaotsiatai.

"It was not until about 7 p.m. on 31st, that the Japanese, having learnt of the repulses suffered by their infantry, finally determined to crush the machine guns in Goutsiatsy with artillery, and

to this end they brought a battery to the village of Datchjaotsiatai, which opened a heavy fire of both shrapnel and common shell.

"In spite of the fact that guns and detachments were well covered, several casualties soon occurred, and until approach of darkness, we continued to suffer severely from this fire, to which we could not reply.

"Finally, at 9 p.m., we were ordered to withdraw, having in the two days' fighting lost 30 per cent. of our *personnel*, killed and wounded, and expended 26,000 rounds of ammunition.

"At 2 a.m. next morning the Japanese assaulted the village with loud cries of "Banzai," but by that time the machine guns were safely behind Liao Yang."

* * * * * * * *

In recognition of the able manner in which the company had been handled, and of the skill and gallantry with which all attempts of the Japanese to take the two hills and village of Maietoun in reverse were defeated, Captain Sourine, the commander, received the 4th Class of the Order of Saint George. The remaining officers were all given decorations, and ten Saint George's crosses were also distributed amongst the rank and file.

Conclusions by the Editor of the *Revue d'Artillerie*.

The first lesson to be learnt from this account is undoubtedly the confirmation of the belief that machine guns cannot cope with artillery. This endorses the experience of 1870, and has never been seriously contested. Under effective artillery fire machine gun companies can only make the best use of all available cover, conceal their weapons as far as possible, which should present no difficulties, and wait for a favourable chance to reply.

The practical annihilation of the Japanese mountain battery proves, that at distances under 1,100 yards, even when ranging has not been possible, good results can be obtained against troops in movement by the employment of traversing fire combined with progressive elevations.

Fire, it seems, may even be effective against isolated skirmishers at these distances, provided that the range can be approximately ascertained.

It is, moreover, important to note that the machine gun company was apparently able to maintain superiority of fire over the Japanese skirmishers at ranges exceeding 750 yards, and invariably succeeded in arresting all attempts to advance over open ground. Lastly, the Russians did not fire at ranges exceeding 2,200 yards, where good results would have been more than problematical.

The expenditure of ammunition was by no means excessive. The 6,000 rounds fired on the mountain battery approximately equal the number of bullets contained in 20 shrapnel, and were delivered in about the same time. On the other hand, this expenditure would have involved the employment of at least 400 rifles, and the effects would probably have been less.

Again, to replenish a consumption of 2,600 rounds in two days' action, or 1,600 rounds per gun per diem, would make no exceptionally heavy demand on the reserves of ammunition available, especially as the Russian machine gun companies carry 5,850 rounds per gun.

Apparently, the best results were obtained by the employment of a combination of progressive elevations and traversing, but under this system the expenditure of ammunition must always be large in proportion to the effects produced. It would seem, therefore, that since ranging with machine guns would rarely be possible, and will always be difficult, every opportunity should be seized of using range-finders, and, above all, of registering, as accurately as possible, all ground within range.

In other words machine gun companies should always be prepared to open a concentrated fire in any direction.

THE GURKHA SOLDIER.

By Major NIGEL WOODYATT, 3rd Gurkhas.

IT is with much diffidence that I write on the above subject, when I think of the many others who could do more justice to the theme. I am also somewhat puzzled how to describe the manners and customs of this gallant little nation without wearying my readers with too many statistics and much unnecessary detail. To avoid this, I will tell a plain, unvarnished tale, and endeavour to describe the sturdy rifleman of the Indian Army from the moment he enlists as "raw material" to the time he blossoms out into the "finished article." I do this in the hope that the narrative may be of more interest to those who, having heard of the Gurkha, really know little about him, and are just as ignorant of his origin, characteristics, and virtues as are—let us say—my own people at home.

In the southern ranges of the Himalayas and north of two Indian provinces, called respectively "Bengal" and "United Provinces of Agra and Oudh," lies the little kingdom of Nepal. This State enjoys complete independence. It is true that a British Resident is endured, and resides at the capital (Katmandu), but he takes no part whatever in matters of internal government. The term "Gurkha" is now the national designation of the inhabitants of this country, but it was originally limited to a people occupying a district of the same name, and situated in the centre of the present kingdom. About 1765, their King—one Prithwi Narain—made his second invasion of Nepal proper, and after some four years' hostilities, conquered the whole valley and established his capital at Katmandu. For the next 30 years the Gurkha was engaged in almost continual fighting for conquest. Sikkim was over-run, and a large portion annexed. Thibet was invaded, and much loot and plunder were acquired. In 1792 a Chinese army managed, with great difficulty, to penetrate into Nepal, and actually dictated terms near the capital; but the damage inflicted by the invaders must have been small, for in the next two years the Gurkhas, striking westward, subdued and annexed the petty States of Kumaon and Garhwal. Indeed, so great was their prowess and so many and so vast were their conquests, that in 1795 they were masters of all the hills and valleys from Bhutan to Kashmir, and from British India to Thibet.

At this time they showed little or no consideration for boundaries; nor would they listen to any friendly remonstrances from their neighbours.

In 1814 the incessant pillaging in our territory and encroachments on our frontier became so intolerable that Lord Hastings could endure it no longer, and declared war against Nepal. After a six months' campaign, during which the Gurkhas behaved with the greatest gallantry and determination, the war came to an end owing to the skilful operations of General Ochterlony. Peace, however, was not yet assured. The Nepal Government would not accede to our de-

mands, and it took a second campaign, under the same capable leader, to bring about the Treaty of Segowli (March, 1816). The province of Kumaon had been given up a year before, and by this Treaty the kingdom of Nepal was reduced to its present size, and a British resident was appointed to Katmandu. Many accounts are given of the extraordinary valour repeatedly shown by our enemies, and I must quote one from Colonel Eden Vansittart's official handbook on Gurkhas regarding a fort called Kalinga:—

> "The defence of this post against General Gillespie was most creditable to the Gurkhas, though exhibiting extreme rashness on his part, as he had been directed to avoid strong works which required to be reduced by artillery. In this defence, Balbhadar and 600 Gurkhas repulsed two assaults, inflicting on the British division a loss of 31 officers and 750 men killed and wounded, including General Gillespie, who was killed when leading the first assault; and when ultimately three days' incessant shelling compelled them to abandon the place, Balbhadar and the survivors, reduced to 90 in number, cut their way through our posts and escaped. The defence of this fort retarded a whole division for over one month."

An anecdote from the same book is also interesting as illustrating their wonderful confidence in British officers:—

> "One day, whilst the batteries were playing, a man was perceived on the breach advancing and waving his hand. The guns ceased for a while and a man came, who proved to be a Gurkha, whose lower jaw had been shattered by a round shot, and who came thus frankly to solicit assistance from his enemy. It is unnecessary to add that it was instantly afforded. He recovered, and when discharged from the hospital, signified his intention to return to his corps to fight us again, exhibiting thus through the whole incident a strong sense of the value of generosity and courtesy in warfare, and also of his duty to his country, separating completely in his own mind private and national feeling from each other."

The King of Nepal is nominally the head of the State, but since the appointment—nearly a hundred years ago—of Bhim Sen Thapa to be Prime Minister, all the power has been wielded by the holder of that office. This Bhim Sen ruled the Gurkha dynasty with great ability for more than twenty-five years. Many attempts were made by the reigning monarch to secure absolute power, with the final result that about 1840 Bhim Sen either committed suicide or was murdered in prison. Some six years later a general massacre of the most powerful nobles brought the famous Chieftain Sir Jang Bahadar to the front. Under his rule an offer was made (1848) to assist us in the Sikh war, but declined. Later (1857), during the troublous times of the Mutiny a similar offer was accepted, and over 10,000 troops, with the Prime Minister and Commander-in-Chief at their head, fought for us against the rebels. At the present time the Nepal Durbar could probably raise close on 100,000 fighting men, all more or less trained, for they have a system of Reserve quite unique, by which their soldiers can return to their homes after a few years' service and re-engage later on.

The population of Nepal is over four millions, and the revenue, if report speaks truly, a good deal more than the official estimate. This is, I believe, from 15 to 20 lacs of rupees. The amount is possibly four times as much, and is principally realised from land rental, plus import and export duties at the various frontier posts.

The origin of the Gurkha is undoubtedly Mongolian. His appearance shows it pretty clearly. The nation consists of many tribes and clans, but the classes enlisted in our Army are almost entirely Gurungs, Magars, Thakurs, and Khas. The two battalions of the 10th Gurkhas recruit exclusively in Eastern Nepal, and mostly enlist Limbus, Rais, Sunwars, and Lamas. The Magars and Gurungs are to be found chiefly in Central Nepal, and were aborigines of the country and of the old district of Gurkha. They have been warriors, pure and simple, from the very earliest times. When not employed fighting, the energy of the Magar tribe has been mainly devoted to agricultural pursuits, and that of the Gurungs to pastoral work. Hinduism, in a mild form, is more or less the common religion, and the higher the grade the stricter the observance. In their own country, it is stated, that the Gurungs are Buddhists; but when serving with our regiments they submit to the more fashionable Hinduism. The Thakur and Khas tribes are of the highest social standing in Nepal—indeed the Thakur claims royal descent—and make capital soldiers, though more inclined than the others to "caste" prejudices. The Khas, possessing much activity of mind, and great intelligence, gradually usurped most of the power, and they are certainly, at the present time, the ascendant race in Nepal. Their language, the "Khas Khura," is now practically the national tongue, and is universally understood except in the far outlying regions of the kingdom. At the same time, in their dealings with the aboriginal tribes, they have displayed much shrewdness, for the latter, being easy-going, docile, and phlegmatic, are content to have all the trouble of ruling done for them, if the hand that wields the sceptre is not too heavy, and if their natural rights and privileges are not unduly interfered with.

The *Pioneer* newspaper states that "two more battalions of Gurkhas are to be raised." We shall then have ten regiments of two battalions each, or a force of about 18,000 men. Of these, the 9th Regiment enlists Khas, the 10th Regiment, and probably the two new battalions, Limbus and Rais, and the remainder almost entirely Magars and Gurungs. Allured by every prospect of employment in the field, our Service is extremely popular. Doubtless the men are not blind to the advantages of good and regular pay, and the fairly liberal pension establishment; but the boy-villagers, noting with envy and admiration the be-medalled veterans settling in their midst, are mainly attracted by the hope of fighting for the "Sarkar"—the name they give to the Indian Government. After joining headquarters it is astonishing to note how quickly they learn to reverence the King-Emperor, whom they look upon with much veneration. Our barrack-rooms are full of coloured prints of the late Queen, and are now filling up with others of the present King and Queen. The most acceptable gift you can make to a non-commissioned officers' room is a picture of our reigning monarch.

At present there is no Gurkha Reserve, if one excepts a few hundred men who, after their service with us, have settled in India. I am not sufficiently well informed to know whether there is any

political reason for this; but it seems a pity to miss the opportunity of utilising the trained services of a considerable number of men when required, and at a very moderate cost. In the Indian Army, a soldier can claim his discharge in peace time after three years' service, provided his company is not ten men short of strength, and there is no expectation of service. These discharges, inclusive of men who fail to rejoin from their seven months' furlough for family and other reasons, amount to about 3 to 4 per cent. per annum, giving a total of over 600 men a year, of which over 500 would be fit for the Reserve. "These ex-sepoys are not apparently drafted into the Nepal Army on their return home, neither are they enrolled in the Militia. Here and there smart men are employed as non-commissioned officers, but the bulk revert to the peaceful population of agriculturists. The reason for this is that in Nepal the sepoy, after serving nine years with the colours, can take his discharge. He is then liable for service in the Militia. Many of them only stay a few years in their villages, and then re-enlist. They are called Dukrias, and they form a powerful Reserve, as their training has been a thorough one. With this system in force, the Nepal Durbar have naturally no occasion to enrol as Reservists the men who have returned from India. They are always available in case of a levy *en masse*—a contingency which is never likely to arise now that the old dread of a Chinese invasion of Nepal has passed away. The Katmandu Government have given every facility during the last fifteen years or so for the enlistment of Gurkhas in the Indian Army. The recruiting does not affect the supply for the Nepalese regiments, and there are the advantages gained of large sums of money remitted by the men to their families and of pensions paid to those who have completed their service. The amount annually paid must be a large one, and it contributes to the prosperity of Nepal. . . . . We are convinced that the Reserve would be most popular with the men themselves, and its creation would add materially to the strength of the Indian Army." Such are the words of the *Pioneer* on this subject in a "leader" last year.

Formerly many impediments were placed in the path of our recruiters by the Nepal Durbar. Our men had first of all to make a long stay on the Indian border to enable them to grow their hair, and thus pass as ordinary villagers. Whispered enticements in the ear of a likely looking boy at some local fair led to midnight trysts in a lonely jungle. Here the keen recruiter mustered his batch for the onward journey, travelling only by night, until the British frontier was reached; but all this is now changed. After the successor to the great Jang Bahadur had been duly assassinated, came an enlightened Prime Minister in the person of Sir Bir Shamsher Rana, and he eventually removed every restriction. Nowadays our men go in freely, and provide annually over 1,600 men to meet all requirements. For this we have to thank Lord Roberts, as it was mainly due to his influence and energy that this free enlistment was permitted. So great was the Field-Marshal's admiration for Gurkhas that he chose one as a "supporter" on the left of his coat-of-arms. In 1886 and 1891 he raised five new battalions, making the 1st to 5th double-battalion regiments. In a few years some of these first battalions will be celebrating their centenary—for the 1st, 2nd, and 3rd were raised in 1815—and after the toast of "The King," loud will be the shouts for "Bobs Bahadur."

The temperament of the Gurkha soldier reminds one of our public schoolboy. The same light-hearted cheerfulness, hatred of injustice, love of games, veneration of superior ability or skill, and tractability, with dogged affection, if well treated—all these mark the resemblance at once. Also, like the schoolboy, he works best and hardest with a firm controlling hand. No punishment, however severe, is ever resented if thoroughly deserved; but with us, punishments are few and far between, I am glad to say. The Gurkha cannot stand "nagging." Once get the men sulky owing to continual "nag-nag," and it is well nigh impossible for the aggressor himself to put matters right again. Many years ago it was the fashion to assert that the Gurkha should not be made smart; his worth was so well known that he might slouch about with impunity, and look generally untidy. A great mistake, I am sure, for now no battalion permits this, and the result is most satisfactory in drill, field work, and appearance.

Unlike most soldiers, our men seem to rather enjoy the many changes that have taken place of late years in drill, manœuvre, etc. It is something new! Free gymnastics was a great joke, and they were immensely amused at "knees up."" One often noticed at these practices small batches of their women folk perched on surrounding features, and evidently much entertained with the antics of their lords, as, stripped to the waist, they developed the muscles of their legs and arms. They are now taking very kindly to "ju-jitsu," as classes have been formed by Captain Dopping-Hepenstal, of my battalion, who went through a course at the London School. But a dearth of instructors makes progress rather slow at present. The men are ideal material, and should, with plenty of practice, become as good as the Japanese at their own game. At manœuvres they show themselves born scouts, with a wonderful eye for country, especially in the hills. The art of skirmishing is to them second nature, and beyond the broadest principles, any attempt to teach from the drill book is unwise. On the range they are good shots—some of them very good. Not long ago I was present when one of our most distinguished soldiers was inspecting some Gurkha mounted infantry for the first time. He was conversing with the late General Hill, a Gurkha officer of whom we were all so proud, and whose untimely death we so much deplore, on the merits of the men generally. "What sort of eyesight have they?" was the first question. "They can see through a brick wall," was the answer. "Are they good shots?" came the second query. "None better," was the reply. "H'm, pretty useful soldiers, then," flashed out the rejoinder.

The good soldier, and I hope there are many among Gurkhas, has a very strict sense of his obligations when on duty. A more zealous sentry it would be difficult to find. When sick, the Gurkha is *very* sick, and in hospital he looks the picture of woe; but about going there or reporting himself ill he is very whimsical. Be the medical officer or his native assistant not to his taste, he will probably do his own doctoring, in spite of exhortation to the contrary. On the other hand, should either or both have gained his confidence, then he puts himself readily under their care; nor does it matter a bit to what faith the native doctor—or "doctor Baboo," as he calls him—belongs. I knew one fine specimen of the subordinate medical establishment, a Mahomedan, who was immensely liked and looked up to by the men.

Devoted to sport generally—though somewhat of a poacher—the Gurkha takes readily to games. Football undoubtedly appeals to him most. When starting the "soccer" game in 1888, I had occasion to write to the late Sir E. Marindin (then a major) on a nicety concerning the "off-side" rule. In his reply he added: "I am glad the Gurkhas are taking to football; I hope they don't draw their kukries when playing!" He evidently thought they would be hot-tempered over it! But not at all, they are very good-humoured, though a foul charge *does* put their backs up. After football, quoits, putting the shot, tug-of-war, and then hockey come next in their estimation.

Gurkhas get much attached to their British officers, and feel their retirement or transfer very keenly. They will do wonders for officers they admire, and the amount of work they can get through when properly managed is truly marvellous. My old colonel (now General H. D. Hutchinson, C.S.I.)—than whom there is no better judge—always used to say that provided you gave the Gurkha plenty of time for his two meals, and provided he saw some definite end in view for his labours, you could work him or parade him with advantage all day and every day. He has an excellent opinion of himself, is most patriotic, and very fond of his country. Indeed, his devotion to the latter is most touching, and his contempt for some of the "plainsmen" is somewhat amusing. A favourite orderly of mine once asked me during a halt in the jungle if my father had served in the Indian Army. On my telling him I had never had a relation out here, he remarked, quite solemnly: "That's like me; I never had a relative in this country, either!"

When there is no fighting to be done, the Gurkha is decidedly domestic. He makes a capital husband and a kind father. Many of them bring their wives with them from Nepal, and in every battalion a married establishment of from 200 to 250 is provided for. The youngsters born in barracks are called "line-boys," and many of them make good soldiers, signallers, bandsmen, etc., if well looked after when young. In the field, too, they are most conspicuous for their daring and courage, being frequent leaders in an attack or assault. An instance of their great intelligence is worth recording. Last summer we were anxious to devise some kind of outer garment to replace the ordinary great-coat—some kind of "over-wear" that could be carried by the man in the field, and which, together with the "British warm" (or thick pea-jacket), now taken by the obligatory mules, would enable the men to have protection in any climate. If possible the garment should provide shelter at night, and with a warm cardigan jacket rolled inside would be strapped to the back of the bandolier. A silver-mounted walking stick was offered as a prize to the Gurkha officer producing the best invention in a fortnight's time. The competition was keen, and the master-tailor was daily seen busily employed in carrying mysterious parcels, carefully concealed, to the houses of the various Gurkha officers. The result was a very clever device by Subadar Kushal Sing. It consists of a cape of Willesden canvas ingeniously constructed so that those of a front and rear rank man can be laced together in a minute or two to form a *tente-d'abri*. If raining, during a march, or when halting on a windy spur after a hot climb, the cape can be unstrapped at once, and every man has a protection from chills. Brass eyelet holes are provided for the lacing cord, pockets for the short-

jointed poles and detachable collar, and small slits for the arms. It seems rather a valuable invention, and, so far as I know, the Subadar conceived the idea quite unaided.

In conclusion, what more can I say about these men? Brave in the field, resourceful in camp, contented and cheerful in barracks, it is indeed a privilege to serve with them. Fortunately for the Indian Army, qualities such as these are by no means uncommon in many of our warlike tribes; but for real hard work in the hills, give me the Gurkha. I have written but a bald narrative of this fascinating people, and worded, as far as I am able, in such a way that my home readers will be able to grasp some idea of these little warriors. He who would know more must consult Brian Hodgson, Oldfield, Wright, Hamilton, etc., and their works on Nepal. Most interesting, too, is the official hand-book on Gurkhas by Colonel Eden Vansittart, of the 10th. From this work, in its earliest editions, I originally learnt almost all I know about Gurkhas, and the author has my very grateful thanks.

PANORAMA *VERSUS* CONTOURED SKETCHES.

By Lieutenant J. M. BLAIR, The Black Watch.

IN view of the increasing importance which is being attached to panorama sketches in reconnaissance work, and also in view of the frequent discussions as to the relative value of each of these types of military sketching (contoured and panorama), a brief comparison of the two with a suggestion as to the circumstances under which each may be employed on service may be of interest.

It often happens that panorama reconnaissance sketches are belittled by those who cannot, or perhaps more correctly think they cannot, draw them. As a general rule it is a case of not having tried or not having tried with sufficient perseverance to attain proficiency in their production. Undoubtedly some find it very much easier than others; artists by nature, for instance, find no difficulty in producing them. But before giving up let those who are not perhaps artists by nature, or those who have come to the conclusion that panorama sketching is beyond them, consider how long, as a rule, it takes to learn to do a good contoured sketch, and thus take heart and devote a little more time and perseverance to the production of panorama sketches. To any in such a position the article on "Reconnaissance Panoramas," by Major McMunn, R.A., in the April number of the *Journal of the United Service Institution of India*, may be recommended.

After due consideration, it will surely be admitted that the heading of this article is incorrect; that there is no case of *versus* in the matter at all, the truth being that each of the two types of sketching dealt with have their own particular time and place, the explanation of which will be gone into presently.

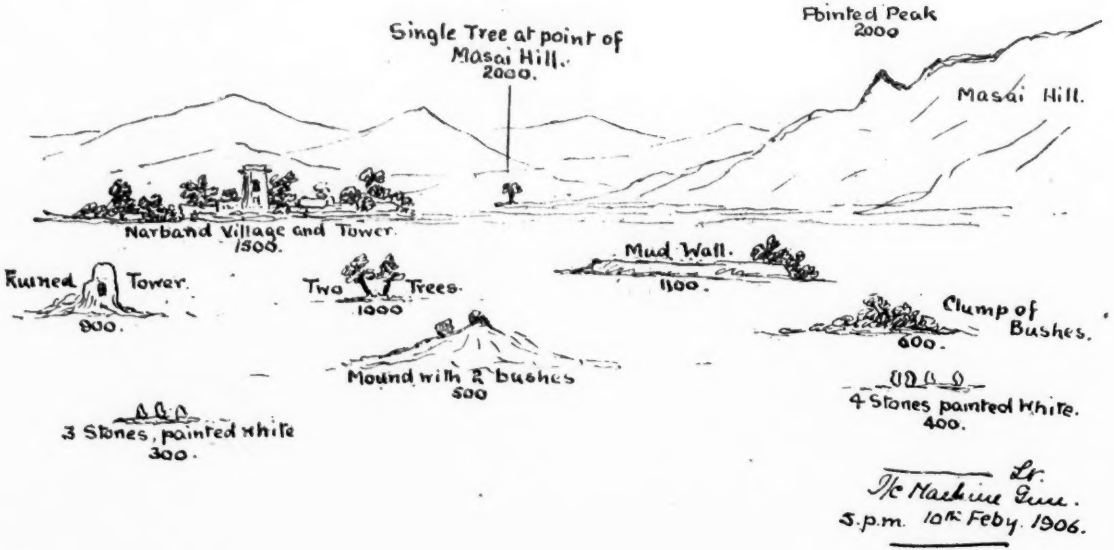
A few words as to the use of military sketching in general may help to make the explanation clearer.

An important fact, which is very apt to be overlooked in all military sketching in peace time, is that on service the essential qualification of a reconnaissance sketch is rapidity in execution; the ideal is rapidity combined with accuracy and legibility; but the essential is rapidity. A rough, though perhaps not very accurate, sketch of an enemy in position handed in a few hours before the attack on that position, may or may not be of any value, the probability is that it will be of inestimable value; whereas an extremely accurate and detailed sketch of the same position handed in a few minutes after the attack has been delivered cannot be of value.

Hence it follows in reconnaissance sketching that he who can combine rapid with accurate sketching is the beau ideal of a sketcher for military purposes.

In these notes very accurate and plane table sketching is not taken into account. As on service, when a plane table sketch or any ground reproduction approaching a survey has got to be carried out, it implies that time for carrying out such work is available; also that instruments are at hand, and for such work trained men can usually be obtained. What is dealt with here is rapid reconnaissance sketching, which might fall to the lot of any officer in

Panorama Sketch, to shew ranges taken from machine gun, at centre of South face of camp perimeter.



Lt.
Mc Machine Gun.
5.p.m. 10th Feby. 1906.

the field, when the point of primary importance is that the sketch should reach the hands of the officer to whom it will be useful with the least possible delay, or at all events be in time to be of use to him in helping him to form his plans and write his orders.

Speed in execution is everything, extreme accuracy desirable, but not a *sine qua non*.

Now, the chief use of a sketch on service is undoubtedly to help to make a report clear, to be, in fact, to the report what a picture is to a book. It is very seldom that an officer is sent out simply to make a sketch; and even if such a case should arise, it is pretty certain that on delivery of his sketch the sketcher will either verbally or in writing give a short explanation or report of his reconnaissance to the authority who sent him out. The class of sketch which is not accompanied by a report or notes on delivery is, as a general rule, one which may be called a map or survey of a tract of country, where the ground is reproduced without any special operations being in view, but with a view to possible future operations, for the assistance of those who may be called upon to conduct at some future date operations in the country mapped. This, as has already been pointed out, is a class of sketching which requires time and special instruments not carried in the fighting line, and is therefore not dealt with in these notes.

A reconnaissance sketch, therefore, contoured or otherwise, is, as a general rule, an accompaniment of a report.

A report is a method of conveying information gained to the person to whom it is of most importance, and obviously the sooner that person gets it the better.

Hence, two points may be deducted as regards the class of sketch to be employed, viz.:—

a. It should be such as to illustrate the report in the best possible way.

b. It should be such that it can be completed with the least possible delay, combined, of course, with as much accuracy as the time available admits.

Probably the expert contour sketcher will say that he can produce a contoured sketch in half the time he takes to draw a panorama, and that therefore a contoured sketch is the one most suited to the occasion; and, *vice-versâ*, the expert draughtsman will say that it is eminently a case of producing a panorama sketch.

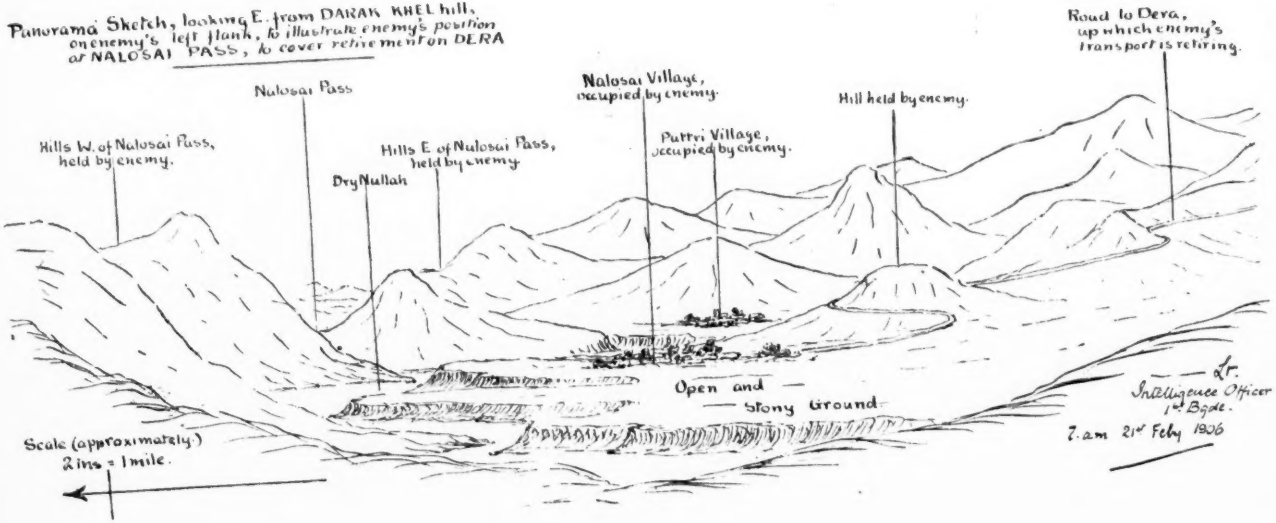
But the points which govern the selection of the type of sketch to be employed are as follows:—

a. The class of illustration which the report requires.

b. The aspect of the ground to be sketched.

For instance, to illustrate what is meant by (*a*), to take an extreme example, it would obviously be impossible to illustrate a report of a road running through woods in a more or less level plain by a panorama sketch; a contoured or reconnaissance sketch would best meet such a case. *But*, at the same time, small panorama sketches of, for instance, strong positions as seen from points on the road might be of great value.

On the other hand, in the case of reconnoitring an enemy defending a very well-defined natural position, it is obviously impossible to execute a very accurate contoured sketch, as in all probability it would be impossible to get within reasonable distance of the position,


Panorama Sketch, looking E. from DARAK KHEL hill, on enemy's left flank, to illustrate enemy's position at NALOSAI PASS, to cover retirement on DERA
Nalosai Pass
Hills W. of Nalosai Pass, held by enemy.
Dry Nullah
Hills E of Nulosai Pass, held by enemy
Nalosai Village, occupied by enemy.
Puttri Village, occupied by enemy.
Hill held by enemy.
Road to Dera, up which enemy's transport is retiring.
Open and
Stony Ground
Scale (approximately)
2 ins = 1 mile.
Lt.
Intelligence Officer
1st Bgde.
7. a.m 21st Feby 1906

and movement from one point to another to get a better view would attract the enemy's attention and probably his fire. Here is essentially a case for a panorama sketch, which can be executed in security from one point.

Again, to illustrate the meaning of (*b*), the natural features of the ground will always determine to a very great extent which type of sketch should be employed; for instance, the rugged hills on the North-West Frontier of India lend themselves to panorama sketching as much as the open rolling veldt of South Africa does not. It may be urged that the South African veldt does not lend itself to a contoured sketch any more than it does to a panorama, which to a certain extent is true; but it can be very much better portrayed on a flat surface as a contoured sketch than as an eye or free-hand sketch.

Hence we arrive at the conclusion that time and circumstance determine which type of sketch should be made use of, and that at times a combination of the two will be of the greatest value.

Thus, if a few of the commonest forms of reconnaissance sketches are considered in turn, some rough guides may be obtained as to what each of these two types of military sketching are particularly applicable.

1. Route reconnaissances, whether of roads, railways, or rivers, of necessity, on account of the large extent of ground which they embrace will, as a general rule, be contoured sketches, though the accompanying reports can very often be made considerably clearer and more intelligible by small free-hand and panorama sketches in the margin or where required.

2. Reconnaissance of a position held by the enemy, as has already been explained, gives the greatest scope to the panorama sketcher, especially if the position held is a well-defined one. Under this heading, besides positions, which may be attacked, are included camps, bivouacs, outpost lines, or other circumstances when the enemy may be at rest.

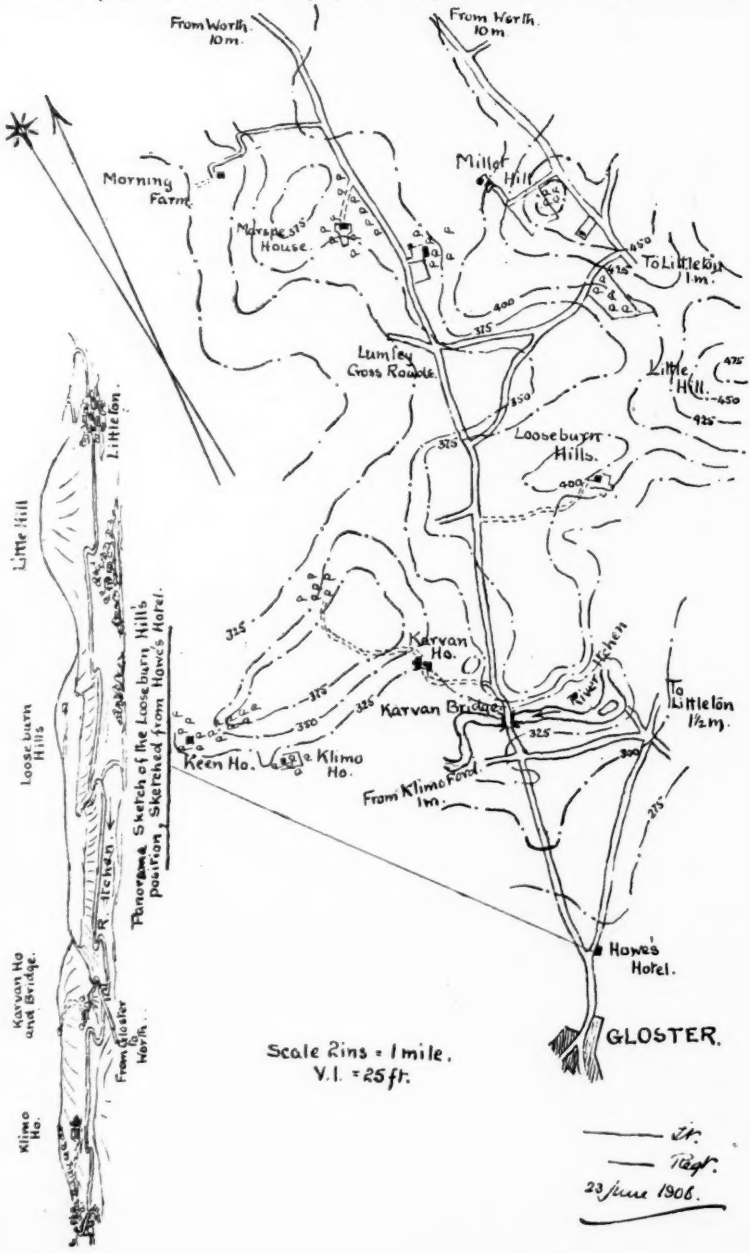
3. Reconnaissance of a position to be held by one's own forces. Primarily, positions of defence will, as a rule, require to be contoured sketches, though panorama sketches of views seen from various points of the position may be of great value either for tabulating ranges of various prominent objects or for explaining possible lines of approach open to the enemy.

Under this heading are included selection of camping grounds, bivouacs, outpost lines, etc.

These are, as a rule, most ordinary rapid reconnaissances, which have to be carried out on service, and the officer who can rapidly execute either kind of sketch will, as a rule, find no difficulty in selecting which of the two is the most suitable for any given circumstance; while to him who may be in doubt, perhaps the best advice is to make use of that type of sketch which will best illustrate the information required, combined with rapidity in execution.

Finally, though panorama sketching is, as a rule, a rough free-hand representation of a piece of country, freely covered with explanatory notes, there is great scope for drawing such sketches to scale, both vertical and horizontal; also fixing points by compass, bearings, etc., which, however, does not come within the scope of this article, but which, however, tend to show that panorama sketching is capable of expansion, and is not merely a rough-and-ready method of representing country on paper.

Part of Road Reconnaissance Sketch from GLOSTER to WORTH.



THE TRAINING OF THE TROOPS DURING 1906.

Remarks by Lieut.-General Sir IAN HAMILTON, K.C.B., D.S.O., Commanding-in-Chief, Southern Command.

Cavalry and Royal Horse Artillery.

DURING the training season of 1906, two Cavalry Regiments and a Brigade of Royal Horse Artillery carried out their squadron, regimental and battery drills on Salisbury Plain, after which they were exercised in combined tactics and then, finally, were manœuvred in conjunction with the three arms.

The fact that the 16th and 21st Lancers do not belong to the Southern Command and only trained there by kind permission of General Lord Methuen, precludes any detailed criticism, favourable or otherwise, concerning their regimental efficiency. Comment will only, therefore, be of a general and impersonal nature, and will be based upon the assumption that these Corps are fair representatives of their branch of the service.

Compared with foreign Cavalry, the British Regiments possess a very distinct advantage in the physique and build of rank and file who, though possibly a little on the big side from the point of view of their horses, are otherwise exceptionally well equipped by nature to become good riders. Their long limbs and flat thighs give them in this respect an advantage over some other nations. As a matter of fact, however, the cavalrymen of at least one other country ride better than the troopers who have worked over Salisbury Plain this summer. It may be urged that the horses of most foreign armies are better trained than our horses, and that a well-broken, mature horse makes good riding, or what passes for such, comparatively easy. But, after all, it is the general average of good riding which, in the long run, trains the horses. A bad rider can ruin a well-trained horse very quickly. Certain foreigners ride more quietly than our men. They seem to have better hands, and do not knock their horses about or job them in the mouth. However this may be, the fact that with us man and horse do not work so well together, handicaps our regiments in steadiness on parade, quickness of deployment and cohesion in the charge. As individual horsemen, our troopers do not leave much room for criticism; as parts of a squadron, there are some others who have gone ahead of them.

All ranks in the 16th and 21st Lancers are remarkably well trained in making full use of the terrain for purposes of cover and concealment. They manage their led horses skilfully and never leave them exposed to view or to the possibility of Artillery fire, an error which is committed, not infrequently, elsewhere. Officers and men show how greatly they have profited by their South African experiences by their highly realistic and effective methods of conducting skirmishing and reconnaissance encounters, whether mounted or

on foot. In these respects the progress which has been made since 1897, 1898 and 1899 (when the then Commandant of Hythe had to inspect the Cavalry quartered in the United Kingdom in fire tactics), is simply astonishing. The scouting is also done freely and well, the system and skill by which officers' patrols are inspired being specially commendable.

Other things being equal then, it seems probable that the 16th and 21st Lancers should be able to gain some not inconsiderable advantages in those preliminary engagements ushering in the more serious actions of a campaign which, minor though they be, have often a profound moral significance. On the other hand, it is difficult to speak in an equally optimistic vein regarding their employment as part of a force working on a large scale. Compared with the best foreign Cavalry, the 16th and 21st Lancers are slow in manœuvring, especially in extended order and when out of the actual control of their Brigadier. It should be understood that this criticism applies only to manœuvring against other troops. At brigade drill for instance, there was no lack of pace or of quickness. But where there was an enemy, and especially where the conditions were not favourable to charges in open or close order, there was a tendency to hang back or look on, even although the infantry conflict might have reached a most critical stage. Partly this failure to play an effective part in the general action was perhaps the fault of the Commanders of the mixed forces, who, mistrusting their own knowledge of the Arm, contented themselves by giving their Cavalry leaders a mere general roving commission to do what seemed best to them; partly, however, it was undoubtedly the fault of the Cavalry leaders themselves in not making a more decisive use of the powers thus delegated to them. Opinions may be divided according to the conditions as to whether Cavalry should charge or shoot, but when their own Infantry is getting worsted they are bound to attempt one or the other. On one occasion this summer an entire foreign Cavalry Division was seen to dismount and boldly enter the sphere of the fire fight to fill up a gap between two converging Infantry Divisions at a critical moment. It is doubtful, judging from Salisbury Plain experiences, whether measures so heroic enter into our schemes for Cavalry training.

It seems possible that slowness in manœuvre and hesitation to attack may be, to some extent, necessary defects of the admirable military quality of making good use of the ground. Our Cavalry have been required to display circumspection and craft so as to economise as far as possible the highly trained and very expensive material of which they consist. Up to a certain point this is right no doubt, but still it is, after all, impossible for a man on a horse to hide himself indefinitely, and we must be careful lest by our methods of training we convey to some minds exaggerated ideas of the value of life. Is it not the case, then, that a little more dash might be well gained even at the sacrifice of a certain amount of concealment? The question is put by a foot soldier; it is not to be taken as laying down the law, but only as an idea for consideration. And the idea is mainly this, that the true reckless spirit of the attack (whether with sword, lance, or rifle) must be sedulously fostered, otherwise no great results will ever be achieved.

The British Horse Artillery serving in the Southern Command has well assimilated the lessons of the South African War as regards fire tactics and a clever use of terrain, but when it becomes to be a

question of working in intimate association with their sister Arm, the conditions of their service place them at a certain disadvantage if compared with their brethren on the Continent of Europe. Our Cavalry squadrons are weak and are but few in number. Even the few which we possess are only occasionally associated with Horse Artillery. Colonel Blane's batteries ("H" and "K") had been, until they arrived on the Plain, at out-stations where no Cavalry are ever seen, and, however good the commander, it is hardly to be expected that young officers, and rank and file on a three years' enlistment, can imbibe the so-called Cavalry spirit by imagination alone.

"H" and "K" had not yet been re-armed with the new gun when they trained on Salisbury Plain, and they should now take note that if they are to reap the full advantage of its powers, even greater dash and daring than in the past will be required from Horse Artillery commanders. On many points, especially the purely regimental points, these batteries compare favourably with foreign horse batteries, but no unprejudiced observer can deny that, owing mainly no doubt to the cause already indicated, some of these latter are, on manœuvres, more consistently and constantly useful to their Cavalry. There are Continental horse guns which form an integral part of the Division or Brigade, and are ever to the fore, either assisting an advance or covering a retirement. In fact, they appear always to be hard at work helping their Cavalry, and to be either moving at the gallop to take up a fresh position, or else very much in action. When actually on the move, or when actually in action, "H" and "K" acquitted themselves admirably, but it happened, not infrequently, that the opening to assist their own side did not seem clear to them, and there was consequently too much standing by, and too great a desire to select the best possible position when the selection of the second or third best would have enabled invaluable time to be saved and would have answered all practical purposes.

Field Artillery.

So great has been the progress made during the past summer in the use of indirect laying and in the art of entrenching, that the methods of 1904 are already, to a great extent, obsolete. 1906 has seen the fruition of the ideas of 1905, and now it is hardly too much to say that within two years the tactics of the Field Artillery serving in the Southern Command have been revolutionised. By the end of the training of 1907, when they will have become quite accustomed to the new gun, they will be, humanly speaking, ready for anything.

It is believed that there are no foreign nations, with the possible exceptions of Russia and Japan, which have so whole-heartedly accepted the principle of indirect fire as ourselves. Some are inclined to restrict the employment of this system to the attack, holding that the guns of the defence cannot keep touch with the shifting lines of the advancing hostile infantry unless they can look at them over their sights; but by constant hard work during the past season, commanders of the batteries on Salisbury Plain have so familiarised and practised all ranks in the art of indirect laying that they have succeeded in shortening the time required to range on an object unseen from the guns by fully 50 per cent. Thus the objection to the use of indirect fire by the defence has perhaps already been

met. It may indeed be pointed out that long before the art had reached its present high expression, the Japanese had prepared the whole of their defensive position South of the Shaho for indirect fire, and that the Russian battery on the defensive, which did so much damage to the 11nd Japanese Division between the 28th February and the 8th March at the Kautailing, was also firing indirect.

Whilst congratulating the Field Artillery on their achievement, it may be well to warn them that the experienced C.R.A. of this Command sees a certain danger in the ease with which indirect fire can be simulated on the manœuvre ground. There no shell are employed to betray errors of line and position, and senior officers of the other Arms commanding at field days, may thus easily be led to form a higher opinion of indirect fire than they would were the scene suddenly to shift to the field of battle or even the practice ground. Admitting this danger and accepting this warning, the Lieut.-General Commanding-in-Chief is still personally satisfied that indirect fire is the fire of the future, and he wishes the Artillery of the Southern Command to continue to practice its employment with the utmost assiduity. In saying so much he is not of course to be understood as implying that there should, under certain conditions, be any hesitation in coming out into the open to fire direct with the new shielded guns. He would, indeed, be glad sometimes to see battery commanders expose their guns more freely to the risk of capture by coming right up into the infantry firing line at the decisive moment. But the Lieut.-General Commanding-in-Chief is convinced that the employment of indirect fire constitutes the most difficult part of Artillery Training, and that once the detachments have thoroughly mastered this method they can always be relied upon to fire direct when required. It must be remembered that much more than mere immunity from danger and loss may be secured by the use of indirect fire. The mere fact that the position of the Artillery cannot even approximately be located, may fill the hostile commander with perplexed anxiety. Indeed, until he can make out more or less where the guns are firing from, he hardly dare commit himself to a decided advance lest he be struck in the flank by an unknown number of batteries. Manchuria provided several examples of this special moral effect of indirect fire.

Entrenching by day and by night has made great progress, both from the moral and material standpoints. Owing to the interest shown by senior officers, and to the zeal displayed by the juniors, a noteworthy advance has been made in eliminating from the minds of the men the false, unworthy idea that digging is a "fatigue." Consequently, just as much emulation was displayed between batteries and brigades in their digging as in their shooting, drill, or any other part of their training. This is as it should be. It marks a great moral advance, and is greatly to the credit of all ranks. In Japan it has been noted as characteristic of a good and bad soldier that the former thinks it an honour to dig a gun pit, the latter stoops to calculate that if he had been a civilian he would have got so much pay for the job. Without aspiring to standards so severe, it may still be reasonably accepted that to dig a trench is every bit as soldierly an action as to polish up a button or fire off a gun.

From the material point of view the epaulments and gun pits constructed on Salisbury Plain are, on the whole, in advance of any standard of excellence excepting only the Japanese standard.

It would not be necessary to make even this exception were it not for one fault common to most of our gun entrenchments, namely, the earth thrown up was not revetted to a sufficiently steep interior slope. The Japanese always made the interior slope of their parapets as steep as possible, extending it over in the form of a bombproof shelter, if time admitted.

Although hardly a field day was suffered to pass without stress being laid upon the necessity for close co-operation between the infantry and artillery, yet, so far, this weighty tactical problem has been insufficiently studied and remains to some extent unsolved. It is greatly to be desired that Commanders should lay the same stress upon it as did General Baron Oku, Commanding the Second Manchurian Army, when he said: "No cannonade until the Infantry begins to take up its position for attack." It is mere waste of ammunition and an encouragement to an entrenched enemy to fire at him before the commencement of the advance with anything but high angle howitzer fire. It is no good firing at the enemy, even with howitzers, until the imminence of the attack has forced him to man his trenches, nor is it any use firing with field guns until the attacking infantry has approached so close as to force the enemy not only to man the trenches but to hold his head up to aim and shoot.

Several times this summer has the assault been made by infantry on one part of the enemy's lines, whilst the attacking artillery had concentrated its fire elsewhere. It was not observed that the artillery of the IVth Division was any better in this respect than the other artillery belonging to the command. Altogether the point of close co-operation between artillery and infantry is one which must be taken up with special energy during the next year's training.

The Heavy Artillery must not allow themselves to be weighed down by their name. At present they have a distinct tendency to display Siege or Garrison characteristics. Next year they must endeavour to throw themselves more unrestrainedly into the spirit and feeling of the Field Army. It would be a great advantage to the Heavy Artillery if their batteries were not scattered, but were brigaded in central stations.

It was very noticeable that Brigades coming to Salisbury Plain from stations where their drill grounds were small and cramped, were at a disadvantage when first they came to Salisbury Plain. Both on the practice ground and on the manœuvre area, their comparative want of freedom of movement, and their hesitation in selecting positions, were unmistakable.

Machine Guns.

The use made of machine guns on Salisbury Plain was partial, desultory and disappointing. This is unfortunate just at a juncture when machine guns are all the world over assuming more importance. As evidence of the part they played in Manchuria, officers may be interested to know that one of the most frequent messages which came back from the Japanese Infantry to their Artillery, was a prayer that they would endeavour to knock out the Russian machine guns. Officers and detachments are not blamed for the small part played by machine guns on Salisbury Plain. The want of blank ammunition and failure on the part of umpires to attribute full weight to scattered

machine guns, must be held partly responsible, but it is believed that the system itself is susceptible of improvement. All recent experience has been in favour of a battery organisation under the direct control of a superior officer. Very often the terrain gives the opportunity of grouping a battery of machine guns on a limited space, which is tactically of vital importance, and where, on the other hand, any concentration of troops must be avoided as affording too good a target for the hostile artillery. In such positions four machine guns may have the tactical value of a battalion or even two battalions of infantry, whereas, scattered along the firing line, they are not worth more than a half company or section. Machine guns should not, therefore, be necessarily regarded in the field as being the property of any particular battalion. They are intended for general use, and there is no reason why experiments should not be made next year by grouping together the various regimental guns during the training of the IVth Division.

Infantry.

At the commencement of the training season of 1906, great stress was laid on Section 59, Para. 1, "Infantry Training, 1905," and endeavours were made to leave companies for the longest possible continuous period at the entire disposal of their captains. The results have amply fulfilled expectations, and a determined effort must be made next spring to carry the principle a step or two further. Battalion, brigade, divisional, and command training are each in their own sphere valuable to the commissioned ranks of the Army, but it happens sometimes in the course of these larger operations that the private soldier is only forgetting what he was taught in the beginning of the year by his captain. If then anything has to be cut down next year, let it be battalion, brigade, or divisional training, or even combined operations, but let nothing be allowed to interfere with the fullest, freest development of company training. By this means, and by this means only, we may hope to succeed in strengthening the sense of responsibility and guardianship amongst junior officers, and in leading young soldiers to understand that they possess in their captain not only a disciplinarian and a commander, but also a teacher—a guide in all difficulties, and, in fact, a personal friend.

The Battalion Training of the 7th Brigade was progressive and thorough. Next year it is hoped that financial considerations may permit all the battalions of the IVth Division to carry out their training on the Plain. Arrangements should be made in 1907 to combine the field practices of the musketry course with battalion training, so as to give fuller effect to the provisions of Section 181, Para. 4, "Infantry Training, 1905."

The Brigade Training of the 7th Infantry Brigade was also very thorough, and full advantage was taken of the variety and extent of ground placed at the disposal of the brigadier to carry out a series of instructive and interesting schemes. The 8th Brigade could not be completed owing to want of funds, and only three of its battalions were able to train for a short period on the Plain. Two of these battalions were very good, as battalions, when they arrived, and all three worked hard during their stay and derived much benefit therefrom.

The Divisional Training and the training of the IVth Infantry Division, in combination with the other Arms, was closely followed by the Lieut.-General Commanding-in-Chief and his General Staff.

As a result, the infantry of the Southern Command may, it is felt, be fairly congratulated on its enthusiasm, efficiency, and readiness for war. In parade steadiness, march discipline, system, thoroughness, prevision and the art of taking infinite pains, the battalions which trained on Salisbury Plain have more to learn than many of us realise. All ranks are trying their best to graft these virtues on to their rebellious national character, but the process is slow, and the victory has yet to be won. There are other military qualities, however, than these just enumerated, and in quickness, keenness, resource, individuality, and inventiveness, the officers, non-commissioned officers and men of the IVth Division would be very hard to beat outside their own Army.

If anyone wishes to see the individual infantry soldier throwing himself heart and soul into his job, crawling long distances on hands and knees in a hot sun, making a rapid dash as hard as he can possibly run over an exposed area, flinging himself impetuously to the ground to avoid being hit by an imaginary bullet, and generally doing all sorts of energetic things that cannot be done "by order," he should come to Salisbury Plain. The native qualities of the best battalions of infantry now serving in the Southern Command cannot be surpassed, and are not surpassed in any of the armies which have, until quite recently, formed our only standards of comparison. It is in the acquired qualities, and especially in the application of forethought, method, and the capacity for grudging neither time, nor trouble, nor rehearsals to get a thing absolutely right, that there is still much to be done.

In preparing for next year's work there are several tactical points to which the attention of infantry commanders is now directed:—

It is of real importance that too great a proportion of the troops, whether in attack or defence, should not be extended during the preliminary stages of the fight. When people get hold of a good idea, there is sometimes a tendency to run it to death. Wide extension and the high standard of individual skill and initiative, which its effective employment demands, is probably the best of the many good ideas derived from the South African War, but even wide extension will not bear being turned into a fetish. If the Company or Section Commander knows his business and possesses a good eye for terrain, he can often push from cover to cover through the long and medium distances in close formation, without suffering too much loss. Whenever a subordinate commander can see his way to closing in his men, he should certainly make the attempt, even if the troops to his right hand and his left may be forced to remain extended, and he thus leaves considerable gaps in the line for the time being. The advantage to a captain of keeping his men in hand to the last possible moment should, in fact, be held to outweigh all questions of uniformity from the point of view of the brigade or battalion commanders. There is, in fact, no special merit in uniformity *per se*. Sometimes it is absolutely necessary to extend to wide interval at long artillery range, but if a further advance carries the company into dead ground, the sections at least should seize the first opportunity to get back once more into close order. It is hoped then that next year commanders will always carefully consider the ground with a

view to seeing whether they cannot, at least in some part of their line of advance, hope to keep a proportion of their men in hand. If they will do this they will find that it will help them to be more original and less sealed pattern than they sometimes are at present in their treatment of a situation. For it is very noticeable that great as is the latitude allowed by regulations for the conduct of an attack, there is always a persistent tendency at work leading to a reversion to a cut and dried formal system.

The importance of adopting the Japanese method of moving very rapidly over fire swept zones, was well understood this year, though not constantly practised.

There is no objection to infantry being rather more venturesome at manœuvres than the umpires might presume they would be if bullets were flying. It is easy to teach troops to be over cautious, but it is bad to command them when that lesson has been learnt.

Experiments will be made next year by flashing a heliograph from the guns into the eyes of the troops under fire, to let all ranks know the moment they have to take cover or open out and advance at the double. But in any case infantry should learn to watch for the flashes of the opposing artillery, and, without any order, to throw themselves down if they are standing at the time in an exposed area. All Japanese non-commissioned officers are carefully trained to practise this artifice.

The system of close communication by means of connecting files between firing lines, supports and reserves has now been well established and worked satisfactorily. Special instructions regarding telegraphic and telephonic communication will be issued at the commencement of next year's training season.

Since his appointment to the Southern Command, the Lieut.-General Commanding-in-Chief has lost no opportunity of insisting upon the importance of entrenchments. Foreign Armies which remained unmoved as long as South African experiences provided the main text for such sermons, are now eagerly assimilating the object lessons provided by Manchuria. This year on the Continent, on two occasions at least, better infantry trenches were dug than were dug during the summer in the Southern Command. Improvement in the use of the pick and shovel is therefore not only essential, but urgent. There are special difficulties in the way of digging on Salisbury Plain owing to the chalky soil; but next year an endeavour will be made to provide facilities so that all units may have full opportunities of practice, not only in excavating trenches, but also in improvising loop-holes and head cover.

Sufficient attention has not been paid by the battalions permanently quartered on Salisbury Plain to the training of their scouts, and to working up their keenness and intelligence as well as their physique. Several of the battalions which had only come up for a short period seemed to have taken greater trouble in this respect.

Royal Engineers.

As there were two field companies of Royal Engineers on Salisbury Plain this year, it was possible to carry out the training, both of the companies themselves and of the troops who worked in conjunction with them, in a much more thorough manner than last year.

The balloon company worked hard during the manœuvres, and on one occasion was of great assistance to the umpires by sending down a succession of sketches showing the position of the various troops during the course of the action. The balloon also did good service in observing fire during the artillery practice. So much having been said, it is necessary to add that the advantage of balloons accompanying a Field Army is still quite an open question. It needs a great mass of valuable information to counterbalance the entire loss of secrecy caused by the publication in the sky of so glaring an advertisement of the whereabouts of the balloon flying force.

The experiment made for the first time this year of attaching infantry officers to batteries of artillery, and *vice versâ*, was in every way a success. It is *esprit de corps* which gives our units of all arms a good conceit of themselves and keeps them constantly trying to be better, and to do better, than other people. But it is *esprit de corps* also which sometimes breeds a feeling of exclusiveness unfavourable to a sympathetic comprehension of the point of view of others, and when it is carried so far it constitutes an obstacle to hearty co-operation in the field. Nothing can be better calculated to break down jealous barriers, where such exist, than a free extension of the principle whereby officers in the Southern Command have been temporarily attached to other branches of the Service, and in this connection it is with special satisfaction that the Lieut.-General Commanding-in-Chief bears witness to the good work done on Salisbury Plain by three naval officers from H.M.S. "Excellent," Portsmouth. If these young officers have learnt as much as they imparted during their autumn campaign on *terra firma*, then both Services have reason to be satisfied with the results of the experiment.

Army Service Corps.

It was not found possible, owing to want of funds, to employ the Army Service Corps with the troops during the training. Owing to this, the Staff had no practice in the supply of troops in the field.

Auxiliary Forces.

All that has been said regarding Regular troops may be held applicable, as far as is warranted by the different conditions of their service, to the Imperial Yeomanry, Militia, and Volunteers.

As the whole constitution of these troops seems to be at present under consideration, the Lieut.-General Commanding-in-Chief does not propose to add anything to the orders or circulars which have already appeared regarding the training of the Auxiliary Forces, beyond emphasising his belief that men who can only devote a few days in the year to military work should not be too ambitious. Brigadiers and commanding officers should therefore see to it that squadron leaders and captains of companies get their full share of the time available, and that when, towards the end of the training, tactical schemes are carried out, they should be run on straightforward, simple lines, and be principally directed towards the improvement of discipline, cohesion, and *moral*.

The Writing of Winter Essays.

Attention is called to the Circular Letter on this subject, No. G.S., S.C./223/3, dated 22nd August, 1905, in which an attempt

was made to show the hopelessness of any attempt to treat officers *en bloc* on a point of literary aptitudes. A regimental officer is required to possess some capacity for dealing with men; some of the qualities of leadership, and an instinct in an emergency for doing the right thing. But he may lack the pen of a ready writer or any strong bias towards abstruse study, and may yet be the best fighting man in his battalion. Discrimination should therefore be exercised, and as few demands for essay writing as is compatible with the Regulations should be made upon the leisure of this class of officer. On the other hand, there are always a proportion of officers in every brigade of artillery or battalion of infantry who have a natural aptitude for the acquisition of theoretical knowledge. These officers should be encouraged to develop their talents by every possible means, and the following quotation from a lecture delivered by Colonel Lonsdale Hale on the 6th January, 1906, may contain some useful advice to the would-be student: "I do not say study only one campaign, but I do say what you do study, study thoroughly before you leave it for another. To whatever branch or subject of war you may incline, let us, after taking it in hand, not let it or its history go until we shall have mastered it as fully, as completely, and as thoroughly as possible with the time, labour, and materials at our hand. . . . . Let the purpose of all our studying be not merely to learn that certain things had been done, but the manner of the doing, and the surroundings that influenced the doing."

Here is a warning to the idle, written this time by Sir Charles Napier: "By reading, you will be distinguished; without it, abilities are of little use. A man cannot learn his profession without constant study of proportion, especially for the higher ranks. When in a post of responsibility he has no time to read; and if he comes to such a post with an empty skull it is then too late to fill it. Thus, many people fail to distinguish themselves, and say they are unfortunate, which is untrue; their own previous idleness unfitted them to profit by fortune."

Last of all, let the late Colonel G. F. Henderson contribute his quota of counsel: "The first thing to do is to learn the tactical sections of the drill-book thoroughly. They are the concentrated essence of modern fighting, based on the experience of many wars, and it is absolutely useless for any officer to study military history until he has the rules, maxims, and principles contained in the official manuals at his finger ends. Then read some manual on minor tactics. A single battle of the 1870 war will give you an idea of what a modern battle-field is like. Certain chapters in 'Mayne's Fire Tactics' are invaluable. When you have done this, set to work on grand tactics; study the battles of Napoleon, Wellington, and of Marlborough; and as far as theory can help you, you have done your duty."

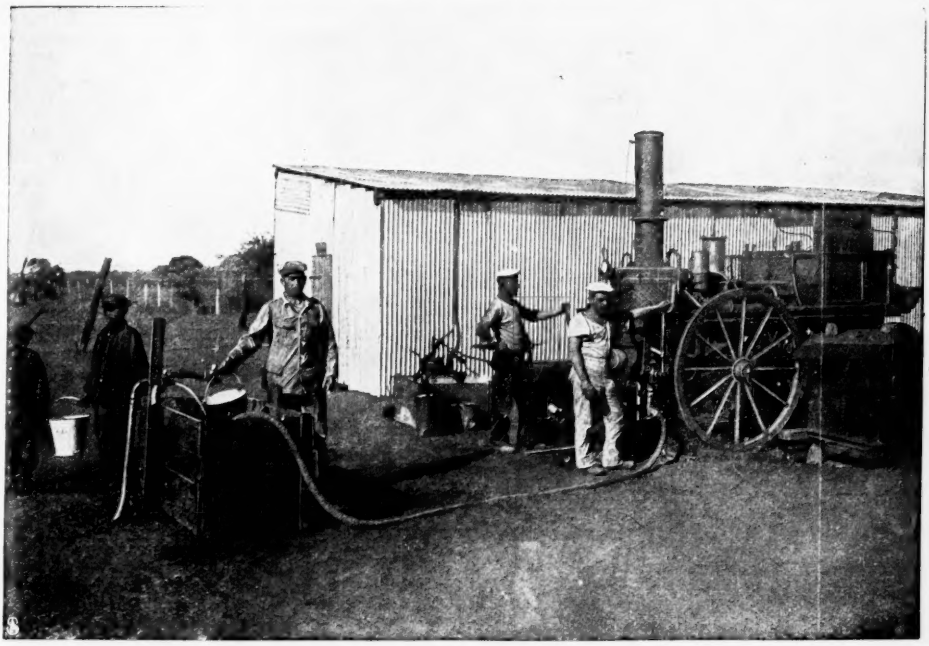


FIG. I.—WATER STATION AT OKAHANDJA (GERMAN SOUTH-WEST AFRICA).

FIG. II.—SIDE VIEW OF TRANSPORTABLE ARMY STERILISER.
CAPACITY 500 LITRES (= ABOUT 110 GALLONS) PER HOUR.

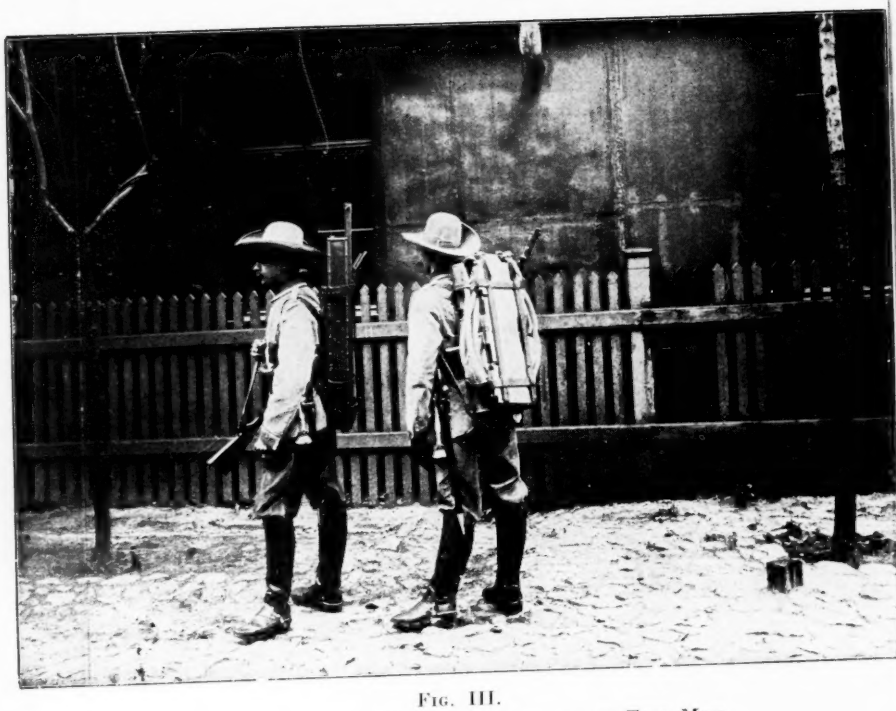


Fig. III.
Small Portable Steriliser Carried by Two Men.

Fig. IV.
Small Portable Steriliser in Operation.

A NEW METHOD FOR STERILISING WATER.

Communicated.

THE German forces operating in South-West Africa have for a considerable time past been employing a new steriliser for rendering water infected with bacteria wholesome and fit for consumption by the troops

Judging by the results obtained, it would appear that the vital problem of keeping a body of men, not to say a whole Army, on active service well supplied with good and pure water had been satisfactorily solved.

The Medical Department of the Prussian War Office was the first to put forward the theory, after very elaborate tests, that a temperature of 220°—230° Fahr. destroys in a very few minutes all germs contained in water, however contaminated it may be.

This valuable discovery led to a variety of experiments being made with a view to embodying the principle in an apparatus which would meet the requirements of the military, and at the same time stand the tests of the medical authorities.

After exhaustive preliminary trials, the German War Office decided to subject the apparatus, which it is proposed to describe, to the exacting conditions of active service in South-West Africa. The success attending the venture fully upheld the confidence created by the trials mentioned, and therefore, perhaps, a description of the apparatus would be of more than usual interest. (*See* Fig. I.)

Although familiar to the readers of this JOURNAL, it would not, perhaps, be out of place to make a few remarks concerning the underlying principle termed "Sterilisation by Heat."

Of all methods of sterilisation, this is without a doubt the most reliable. It may, however, be put forward that distillation also produces sterilised water. Granted; but it should be borne in mind that distillation aims rather at a chemical than a bacteriological purification, and the heat necessary to distil a given quantity of water is six times the amount required for sterilisation. The heat necessary to sterilise water thoroughly being 220°—230° Fahr., this temperature is, of course, obtained under pressure; but a few minutes only are sufficient to kill all germs present.

Professors Proskauer and Schuder, of the Royal Institute for Infectious Diseases, Berlin, who carried out the tests, found that water purposely infected with the germs of cholera, typhoid fever, and dysentery was perfectly wholesome after treatment in the steriliser.

The steriliser in question, known as the "Hartmann," consists, roughly speaking, of three essential parts.

In the first place there is the boiler for raising the water to the requisite temperature; secondly, the cooler for reducing it after sterilisation to more or less the normal temperature; thirdly, the

filter for removing any matter in suspension and impregnating the water with germ-free air in order to remove the insipid taste of boiled water.

For military purposes there are three types, each varying in size according to requirements.

The one most used by the Germans is of the horse-drawn, transportable type, producing 110 gallons and upwards per hour. (*See* Fig. II.)

The needs of a garrison are met with the stationary type, with a capacity up to 2,200 gallons per hour.

The third variety is a small portable affair weighing a little over 100 lbs., with an output of 22 gallons per hour. It is so arranged that it may be carried by two men or on a pack mule, and was found very serviceable in South-West Africa with small expeditionary forces. (*See* Figs. III. and IV.)

All types of these sterilisers are constructed so as to reduce the waste of water to a minimum; that is to say, the cooling water, after

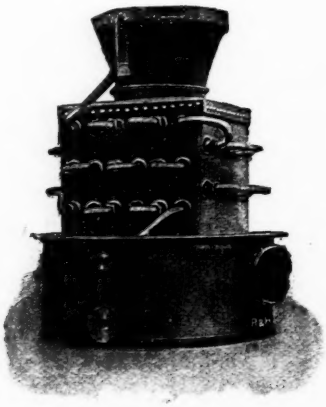


FIG. V.
FIRE-BOX WITH WATER TUBES AND
STERILISING TUBE.
BOILER SHELL REMOVED.

it has done its duty and consequently become hot, instead of being run off passes into the boiler to be sterilised. This effects a very great saving in fuel as well as in water, and is moreover an invaluable advantage where the water supply is at all limited.

Although the particular steriliser referred to is the Military Transportable, the general arrangement is much the same in all types, differing only in minor details which do not affect the principle or results in any way.

The boiler is a vertical type and is made of copper. (*See* Fig. V.) The firebox is square, and the opposite sides are connected by rows of water tubes arranged alternately from right to left and front to back. A copper tube of smaller diameter than the cross tubes

passes through each of the latter consecutively; being smaller, it permits of a free circulation of water round it. It is made in sections to facilitate cleaning, and commences its sinuous course through the boiler tubes at the top of the firebox, and on emerging at the bottom is flanged to the shell of the boiler.

Briefly explained, the process of sterilisation is as follows: The boiler is heated until a head of steam of 5—7 lbs. per square inch is obtained. This pressure, under which the water has the necessary temperature of 220°—230° Fahr., forces the water, which is already practically sterilised, through the tube just described. Entering by the upper orifice situated in the dome of the boiler—that is to say, the hottest part—its passage occupies at least a minute before the outlet is reached.

An ingeniously constructed valve renders it impossible for the sterilised water to enter the tube before the requisite pressure and consequently temperature has been attained, and at the same time the feed water is automatically cut off, so as to exclude any possibility of a cold current being forced up to the top of the water in the boiler by the pump, and then being drawn into the tube before sterilisation has taken place.

As the water is already sterilised before entering the tube, it will be seen that the latter really prolongs the period of sterilisation, and thus makes an absolute certainty of it.

The pressure recorded on the gauge not being always a true indication of the temperature of the water in the boiler, a thermometer is placed at the outlet of the tube. If this registers the proper temperature, it is certain (as the water enters the tube at its hottest, and cannot do so until the requisite temperature has been reached) that it has been subjected to at least the same degree of heat during its passage through the tube.

The sterilised water now passes to the cooler. The cooling surfaces are so arranged and of such proportions that, working at its utmost capacity, the sterilised water is reduced to a temperature of not more than 8° to 9° Fahr. above that of the supply.

After having been cooled, the water then enters the filter through a rose. The latter causes it to fall in the form of a spray over the filtering media, consisting of pumice stone and bone charcoal.

The partial vacuum created in the upper part of the filter opens a valve and allows air to enter, which, however, has first to pass a cotton wool filter in order to prevent a possible re-infection of the sterilised water.

The air and the charcoal combined remove the insipid taste of boiled water.

The boiler is usually fed by a hand wing pump, a second one being used for the cooler. However, by means of the two 3-way cocks both pumps may be used for filling either the boiler or the cooler.

In the larger sizes of this type of steriliser, such as those producing 220 gallons and upwards per hour, the hand pump is used only for filling the boiler in the first instance, as a steam pump, working at a pressure of 5—7 lbs. per square inch is provided. Before commencing, the whole apparatus can be sterilised by passing steam from the boiler through it. Thorough sterilisation will be found to have taken place if the steam be allowed to issue for five minutes from the water cocks.

As it happens more often than not that persons of limited technical knowledge are called upon to look after like apparatus, it is satisfactory to know that the construction is of the simplest, and that as the various phases of the process are governed more or less automatically, little technical skill is required.

Although working at a very low pressure, the boiler of each steriliser is provided with a safety device which prevents the pressure exceeding the maximum required of 8 lbs. per square inch.

It would be highly interesting as well as instructive to have a series of trials carried out here and in the Colonies under the conditions which our own experience has shown to be the most likely to expose the merits and demerits of the system.

In any case, after the favourable results obtained by the German military authorities, further experiments in this direction may reasonably be expected to realise more than the amount of success generally associated with innovations of this kind.

SAVAGE WARFARE.

By Captain L. F. RENNY, the Royal Dublin Fusiliers.

THERE exists a class of fighting upon which none of the drill books or tactical treatises dwell, but with which a large section of the officers and non-commissioned officers of the British Army come in contact. I am speaking of bush fighting against natives armed with bows and arrows, spears, and guns of various obsolete patterns.

Many an officer goes out to countries where he will be in command of black troops, and will meet this class of fighting, and no previous experience will help him much towards adopting reasonable tactics or measures to cope with the ambushes which a savage enemy is sure to lay for him. *Previous to gaining any experience in the matter*, I think it would puzzle any officer to work out what is the best formation to adopt with a company 150 strong moving in a hostile country through thick bush along a bridle track not more than two feet wide, with perhaps 100 carriers to safeguard in the event of being attacked. With such a column (moving perforce in single file), how is he to quickly get his non-combatants under cover of the troops?

It is solely with the idea of helping brother officers who are likely to be suddenly put in such a position without previous experience, that I have written these few lines, which do not claim for themselves any further pretensions. With this idea, therefore, I will take the following column (native troops) as an example:—

1 company infantry, 120 strong, 1 officer, 1 British non-commissioned officer.
1 Maxim gun.
1 millemetre gun and artillery detachment, under British officer or non-commissioned officer.
With 100 carriers for baggage and ammunition.

The following formations will now be discussed:—

1. Dispositions on the march.
2. "Alert" or "Halt" formation.
3. Forming square.

1. The infantry is divided into 4 sections, each of 30 rank and file, which sections are the fire units. The following will be the order of march (in single file):—

a. No. 1 section of infantry, which should if possible be formed of men trained to the Maxim gun, which will generally march at the head of the column, and will have in rear of it half the ·303 spare ammunition carriers (10).

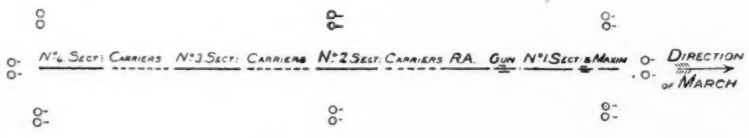
b. The sub-section of artillery will march immediately in rear of the leading section, and will be followed by its ammunition carriers (20) and half the ·303 spare ammunition carriers (10).

c. No. 2 section infantry will be followed by half the baggage carriers (30).

d. No. 3 section infantry will be followed by half the baggage carriers (30), who will be followed by No. 4 section forming the rear guard.

The leading section of infantry will throw out as scouts a "point" of 2 men 20 yards in advance along the track, and also a file on each flank in line with the head of the column and 20 yards distant from it on each side. It has been found impracticable when moving through bush to allow these scouts to move at a greater distance from the column, as owing to the windings of the track it is very easy for the flankers to lose touch with the column, and ambushes laid by the enemy are nearly always at a short distance from the bush tracks. It is also impossible to throw out a regular screen of scouts in front of the column, as they would never be able to keep in touch. Similar scouts to the above will be thrown out by the rear section as a rear guard, and two men on each flank will be put out by No. 2 section in the centre of the column.

The following diagram shows the column on the march as detailed above:—



2. On the "Alert" or "Halt" being sounded or notified:—

   a. The Maxim gun will at once come into action, front, supported by No. 1 section, which will come into line on the right or left of the gun, with flanks thrown back.

   b. Nos. 2, 3, and 4 sections infantry will halt, the rear rank men turning to the left and the front rank to the right, or alternate men turning to right and left, all then taking three paces forward to clear the track, and thus leaving sufficient space for the carriers in rear of each section to close up between the ranks, which having been done, each section is moved up to join on to the section in front.

   c. The artillery sub-section will close up behind the leading section of infantry; gun and ammunition carriers closed in as above. *All the scouts will remain out during the "Alert" or "Halt" formation.*

The column will now be in the formation shown in the following diagram:—

It will be seen that this formation has the advantage of bringing all non-combatants under cover, and fire can at once be opened in the event of the column being suddenly attacked when halted for rest or water, and the millemetre gun can be run into action in any direction required.

3. *Formation of Square.*—For the type of fighting I am describing it is most important, naturally, for the square to be performed with great precision and quickness, owing to the sudden attacks which are to be expected.

It may be necessary to move in square formation for a considerable distance before reaching the enemy's position or town, and therefore moving in this formation should be frequently practised.

The following appears to be the best and most expeditious method of forming square with such a column as we are considering:—

a. The Maxim gun and leading section infantry will form the front face of the square, the gun coming into action in the centre or at either flank of the face as may best suit the circumstances.

b. The sub-section artillery will close up immediately behind the centre of the front face; the gun will be mounted and further orders awaited, unless an immediate target is offered.

c. No. 2 section infantry will form the right face, No. 3 section left, and No. 4 the rear faces, all fixing bayonets when in position, and await orders.

d. The carriers will double up with the sections and sit down with their loads inside the square. All scouts will double back and join their sections on the command to form square being given.

From either the "Alert" or square formation, column of route should be formed in the same order as previously. *Too great care cannot be taken to ensure that a column moving in single file through the bush is kept closed up.* On crossing any obstacle likely to delay the column, the leading section will halt at a suitable distance beyond the obstacle until the advance is sounded by the O.C., each section as it crosses the obstacle closing up and adopting the "Alert" formation.

The above description of the various formations can easily be adapted to a column of any size suitable for bush fighting; either of the guns can be marched with the rear section in the event of a rear guard action being expected on any day's march, and forming square on the rear section should be practised.

As already mentioned, my reason for attempting this article is solely the absence in all official books of any hints as to the type of fighting described, and I think many will agree with me when I say that a chapter on the subject might with advantage be added to our drill books. It is a subject which would easily bear a much more detailed description than I have attempted in this short paper.

NAVAL NOTES.

HOME.—The following are the principal appointments which have been made :—Rear-Admirals—R. A. J. Montgomerie, C.B., to Command of Torpedo and Submarine Flotillas; H. S. F. Niblett to Command of Devonport Division of Home Fleet; F. Finnis to Command Chatham Division of Home Fleet. Captains—E. R. Farquhar to "Magnificent"; E. R. Le Marchant to "Hogue"; Hon. A. E. Bethell, C.M.G., to "Hindustan"; B. Currey to be Assistant-Director of Torpedoes; D. Beatty, M.V.O., D.S.O., to be Naval Adviser to Army Council; R. P. Purefoy, M.V.O., to "Black Prince"; Hon. R. F. Boyle, M.V.O., to "Bacchante"; R. J. Prendergast to "Aboukir"; E. F. Charlton to "Ariadne"; Price Vaughan-Lewes, D.S.O., to "Nile"; S. St. J. Farquhar to "Doris." Commanders—H. Blackett to "Topaze"; G. C. Quayle to "Pegasus."

Rear-Admiral Sir H. D. Barry, K.C.V.O., hoisted his flag in command of the Third Cruiser Squadron on board the first-class armoured cruiser "Bacchante" at Portsmouth on 10th November. His flag was struck at sunset, and he rejoined his flag-ship at Marseilles on the 2nd inst. The "Bacchante" left Portsmouth for Gibraltar on the 21st ult., arriving on the 25th; here she met the "Leviathan," flag-ship of Rear-Admiral the Hon. Sir H. Lambton, K.C.V.O., C.B., which ship she relieves and exchanged crews with on the 27th ult., the "Leviathan" leaving for England the same day, arriving at Portsmouth on the 30th ult. She has proceeded to Chatham, and is to be attached to the Chatham Division of the future Home Fleet.

The first-class battle-ship "Magnificent," from the Atlantic Fleet, paid off on the 5th ult. at Devonport; the new first-class battle-ship "Africa" commissioning at Chatham on the following day to take her place in the Atlantic Fleet. The first-class battle-ship "Prince of Wales," which has been undergoing a thorough refit of her engines after recommissioning, left Portsmouth on the 14th ult. to return to the Mediterranean. The first-class battle-ship "Irresistible" arrived on the 18th ult. at Sheerness from the Mediterranean, paid off at Chatham on the 26th ult., recommissioning on the following day for a further term of service in the Mediterranean, for which station she left on the 29th ult.

The second-class cruiser "Diana," from the Mediterranean, paid off on the 5th ult. at Devonport, recommissioning the following day for a further term of service, and leaving on the 14th ult. to return to her station. The second-class cruiser "Vindictive" left Chatham on the 27th ult. for Colombo, taking out new crews for the third-class cruiser "Pegasus," which recommissions there for a further term of service in Australia, and for the surveying-ship "Sealark," which also is to recommission at that port.

Test of Gunlayers : Results for 1906.—The following returns have been officially issued of the gunlayers' test for 1906. The ships are placed in their order of merit, and the fleets and squadrons to which they

belong are denoted as follows:—"C," Channel; "M," Mediterranean, "A," Atlantic, *, Second Cruiser Squadron.

Ship.	Points.	Guns or Turrets.		Rounds.	Hits.
		Nature.	No.		
* Drake	124·49	9·2-in.	2	18	17
		6-in.	16	149	129
A King Edward VII. ...	123·09	12-in.	2	14	13
		9·2-in.	4	33	30
		6-in. B.L.	10	101	87
* Cumberland	121·28	6-in. B.L.	12	123	95
M Formidable	118·30	12-in.	2	11	6
		6-in. B.L.	12	119	103
A Hindustan	114·94	12-in.	2	16	10
		9·2-in.	4	34	33
		6-in. B.L.	10	90	78
M Carnarvon	114·31	7·5-in	4	38	32
		6-in. B.L.	6	47	45
* Duke of Edinburgh ..	110·77	9·2-in.	6	51	44
		6-in. B.L.	10	81	71
M Venus	108·63	6 in. B.L.	11	96	78
C Hampshire	107·52	7·5-in.	4	—	35
		6-in. B.L.	6	—	39
Diana	105·84	6-in. B.L.	11	99	76
A Majestic	104·98	12-in.	2	18	12
		6-in. Q.F.	12	108	88
Shearwater	104·65	4-in. Q.F.	6	49	39
C Good Hope	101·44	9·2-in.	2	16	12
		6-in.	16	131	107
M Bulwark	99·35	12-in.	2	20	15
		6-in. B.L.	12	98	78
M Minerva	97·49	6-in. B.L.	11	101	70
C Exmouth	95·40	12-in.	2	19	16
		6-in B L.	12	119	86
M Leviathan...	94·60	9·2 in.	2	16	10
		6-in. B.L.	16	133	101
A New Zealand	92·03	12-in.	2	17	15
		9·2-in.	4	26	21
		6-in. B L.	10	73	62
M Lancaster...	90·64	6-in. B L.	12	86	71
A Magnificent	90·19	12-in.	2	16	11
		6-in. Q.F.	12	92	75
Crescent	88·13	9 2 in.	1	9	7
		6-in. Q.F.	12	100	70
C Montagu	87·35	12-in.	2	13	8
		6-in. B.L.	12	105	73
M Irresistible	86·25	12-in.	2	18	8
		6-in. B.L.	12	100	72
M Venerable..	85·76	12-in.	2	16	11
		6-in. B.L.	12	88	69
Prometheus	84·53	4-in. Q.F.	8	61	42
M London	84·23	12-in.	2	14	7
		6-in B.L.	12	95	71
A Commonwealth	83·82	12-in.	2	18	12
		9·2-in.	4	26	20
		6-in. B.L.	10	75	57
M Juno	83·56	6-in. B.L	11	86	60
Topaze	83·18	4-in. Q F.	12	89	62
C Prince George	81·66	12-in.	2	15	11
		6-in. Q.F.	12	80	67
M Implacable	81·44	12-in.	2	12	4
		6-in. B.L.	12	94	71
Powerful	81·41	9·2-in.	2	6	5
		6-in. Q.F.	16	110	93

Test of Gunlayers—continued.

Ship.	Points.	Guns or Turrets.		Rounds.	Hits.
		Nature.	No.		
C Cornwallis	80·94	12-in.	2	14	7
		6-in. B.L.	12	90	68
* Black Prince	77·87	9·2-in.	6	32	21
		6-in. B L	10	71	60
Andromeda	77·40	6-in. Q F.	16	109	83
A Dominion	76·15	12-in.	2	15	12
		9·2-in.	4	23	19
		6-in. B.L	10	63	50
M Queen	76·08	12-in	2	—	10
		6-in. B.L	12	—	61
C Cæsar	75·47	12-in.	2	13	8
		6-in. Q F	12	81	72
* Berwick	74·04	6-in.	—	—	58
C Albemarle	73·44	12-in.	2	10	6
		6-in. B.L	12	87	62
* Cornwall	72·77	6-in. B.L.	12	94	57
C Roxburgh	72·59	7·5-in.	4	33	24
		6-in. B.L.	6	37	26
A Victorious	72·07	12-in.	2	15	11
		6-in. Q.F.	12	81	58
A Amethyst	68·43	4-in. Q.F.	12	97	51
Dido	68 24	6-in. B.L.	11	71	49
A Arrogant	67·14	6-in. Q.F.	10	69	45
C Jupiter	66·86	12 in.	2	13	10
		6-in. Q.F.	12	72	54
M Suffolk	63·83	6-in. B L.	12	77	50
A Diamond	61·72	4-in. Q.F.	12	95	46
C Duncan	60·47	12-in.	2	10	5
		6 in. B.L	12	85	51
C Illustrious...	59·15	12-in.	2	9	4
		6-in. Q.F.	12	67	32
Forte	58·31	6-in. Q.F.	2	13	8
		4·7-in. Q.F.	8	71	35
C Goliath	56 22	12-in.	2	16	10
		6-in. Q.F.	12	79	44
C Ocean	49·56	12-in.	2	9	4
		6-in. Q.F.	12	75	43
C Glory	45·96	12-in.	2	11	7
		6 in. Q F.	12	65	37

FRANCE.—The following are the principal appointments which have been made:—Capitaine de Vaisseau—H. A. Calloch de Kerillis to "Saint Louis." Capitaines de Frégate—E. J. Bénard to "Lalande"; J. A. Allemand to "Dragonne" and 1st Torpedo Flotilla in the Mediterranean; C. R. Nicol to Command of Fixed Defences at Toulon; E. J. Barbin to "Jean Bart"; V. M. Rageot de la Touche to "Manche."—*Journal Officiel de la Republique Française.*

Steam Trials.—The new first-class battle-ship "Patrie" has completed her acceptance trials, which have been carried out, after the final opening up of the machinery and its careful inspection at the end of the first series of trials, satisfactorily. The results were as follows:—At a three hours' run at full speed, with three-quarters of the fires alight, the engines developed 17,900-I.H.P.—400-H.P. over the contract—giving a speed of 19 knots, with a coal consumption of 171 kg. (380 lbs.);

during a ten hours' trial, the engines making 114 revolutions and developing 17,950-I.H.P., a speed of 19·1 knots was maintained, with a coal consumption of 842 gr. (1·85 lb.) per I.H.P. per hour; during one hour of this trial the I.H.P. rose to 19,200, giving a speed of 19·4 knots, being a knot and a quarter over the contract. The Niclausse boilers worked the whole time without any hitch.

These two trials are the first of the kind to which any ship has been subjected in France, the object being to see what the ship could do on an emergency with three-fourths of her boiler power, should the other fourth have been damaged by any accident in war, and the excellent results obtained have given the greatest satisfaction, full credit being given to the great "Forges et Chantiers de la Méditerranée," at La Seyne, where the ship was built.

The new first-class armoured cruiser "Victor Hugo" has commenced her trials at Lorient. With the engines developing 7,000-I.H.P. at her first trial, a speed of 16·2 knots was maintained; at the 16,000-H.P. trial, the actual I.H.P. developed was 17,500, giving a speed of 20·8 knots.

The new first-class armoured cruiser "Jules Ferry" has also made a successful progressive power trial at Cherbourg. The engines developed 27,691-I.H.P., with a coal consumption of 850 gr. (1·88 lbs.) per I.H.P. per hour, and 183 kg. (403·50 lbs.) per square metre of grate surface, while a speed of 22·3 knots was obtained.

The new first-class battle-ship "République" has also completed her first acceptance trials; at a three hours' run with three-fourths of her fires alight (that is in 18 boilers), the engines made 120 revolutions, giving a speed of 18·8 knots, with a coal consumption of 166 kg. (366 lbs.) per square metre of grate surface. During the ten hours' run, with all boilers alight, the engines developed 17,620-I.H.P., with a coal consumption of 115 kg. (254 lbs.) per square metre of grate surface, giving a speed of 18·8 knots. This trial was made under very unfavourable conditions of weather, as it was blowing hard with a heavy sea on.

A New Apparatus for Steering Torpedoes.—Experiments have been carried out recently at Toulon with an apparatus, the invention of a civil engineer, M. Justinien, for steering torpedoes. This apparatus, which the inventor calls a "Faseau électrique," can be fitted to any torpedo in less than five minutes. To the apparatus is attached a single cable, which, unwinding as the torpedo moves through the water, conveys the current from a small dynamo fitted at the place from which the torpedo is discharged. The cable is thin and light, and does not diminish the speed of the torpedo by more than 15 or 20 per cent. The electric current acts on the rudder of the apparatus, which is able to alter the course of the torpedo as desired. Up to the present the trials have given satisfactory results, a target moored behind a breakwater having been struck each time, the torpedo being steered round the protecting obstacles without difficulty. The next experiments will be against a moving object, and in steering it in and out among various obstacles. The Whitehead torpedo is a formidable weapon, constantly undergoing improvements. Recently the new Obry apparatus ensured a straight trajectory; now we have the Justinien apparatus, the aim of which is to change its straight course at will.

Burning of the Torpedo School-ship "Algéciras" at Toulon.—A disastrous fire broke out on board the "Algéciras," the torpedo training-ship for torpedo mechanics at Toulon on the night of Sunday, the 25th

ult., which resulted in the complete destruction of the ship. It was a little after 10 p.m. on the night in question that the outbreak was first discovered by the officer on duty, the men being all in bed at the time. The alarm was at once given, but in spite of every effort to save her, the ship was soon in flames from end to end. She was an old steam three-decker, launched at Toulon in 1855, and has for many years been employed as a school-ship, being moored alongside one of the jetties. As soon as it became evident that the ship could not be saved, steps were taken to remove the new battle-ship "Patrie" and the destroyer "La Hire," which were lying close to the doomed ship, into positions of safety. The "Algéciras" continued to burn all Monday, by which time she was burnt to the water's edge. Three men were lost in the fire, and a large amount of valuable *matériel*, including over sixty torpedoes, search-lights, dynamos, electric motors, besides a complete installation for wireless telegraphy, was destroyed. It is believed that the ship was deliberately set on fire, and three men have since been arrested. Only a few days previously a disastrous fire broke out at the "Forges et Chantiers de la Méditerranée," at La Seyne, in which the greater portion of the workshops at that celebrated yard were destroyed, as well as a large quantity of seasoned timber, plans of ships under construction, and valuable models of battle-ships, including that of the Russian battle-ship "Tsarévitch" and armoured cruiser "Bayan," both built at this yard. This fire is also believed to have been caused by incendiaries, and several hundred men have been temporarily thrown out of work by it.—*Le Yacht* and *Le Moniteur de la Flotte.*

Admiral Fournier's Report.—In his report on the naval manœuvres, 1906, to the Minister of Marine, dated Paris, 17th September, 1906, Admiral Fournier commences by stating that the programme for the naval manœuvres was drawn up with a view to investigate two equally important matters, namely, to try on a large scale the new signals, scouting instructions, and battle regulations for the fleet, and also to verify by combined operations of coastal war the utility of the defensive flotillas and submarines.

After praising the conduct of the officers and men, and the ability and zeal shown by all ranks, and thanking Parliament for providing the necessary funds for these manœuvres, the Admiral continues his report under separate heads as follows:—

New Code of Signals.—This gave complete satisfaction, and was brought into use from the first day of the assembling of the fleet without any difficulty or mistake.

Tactics of Light Squadrons.—The new instructions for scouting, keeping in touch, and reconnoitring proved the necessity for some modification which can now be considered as definitely settled.

Battle Tactics.—The most important innovation of the new battle tactics, the manœuvring of the fleet when in line of battle by divisional groups, has confirmed the views previously held with regard to the necessity for some such system with a large fleet, particularly as regards the following points:—

1. The system is applicable when, during an action, it may be impossible, on account of the smoke or on account of damage, to take in or make signals.
2. It assists in preventing a concentrated fire by the enemy on any one portion of the fleet.

3. It gives the fleet itself the power of rapidly concentrating its fire on the enemy, if, when during approach or while manœuvring, he should give an opportunity or expose part of his fleet.

The exercises showed also the possibility of keeping the main portion of the line of battle out of range of a division of the enemy which might be attempting to enfilade the line, by keeping him at a distance with the concentrated fire of the three nearest flank divisions, disposed *en échelon* They have also shown the facility with which a fleet can change from this formation to a single line of battle, proving that far from hampering the Commander-in-Chief, the new tactics, on the contrary, place at his disposal the power, if he wishes, at any time to retain the full direction of his fleet.

It may, and probably will, be often impossible for an Admiral to keep the direction of the whole of a large fleet when in action, and those who expect victory from the inspiration or genius of one man lose sight of the possibility of his being put out of action himself; the way in which victory can be most likely assured is by giving him free manœuvring powers and good subordinates.

Admiral Fournier then proceeds to draw lessons from the battle of Tsushima, and says the chief thing to be guarded against is the possible concentration of the enemy's fire on a few ships by a faulty initial formation, the prime cause of the overthrow of the Russian fleet being the destruction of its leading ships exposed to the concentrated fire of the line-of-battle-ships and cruisers under the personal leadership of Admiral Togo. The lessons to be learned are, that a large fleet should be, above all, particularly cautious in arranging its preliminary formation of approach and its deployments in battle, so as to prevent the concentrated fire of the enemy on any one portion.

Conduct of the Fleet.—The plan adopted was that of giving full administrative autonomy to the different squadrons, thus lessening the personal strain on the Commander-in-Chief. As regards the distribution of orders, the system was that which is usual in the French fleet: The Commander-in-Chief gave the general idea of the operations he proposed to carry out, leaving the arranging of the details for the execution of his orders to his Chief of the Staff, a capitaine de vaisseau, and his A.D.C.'s.

The Bombardment of Algiers.—The operation of the bombardment of Algiers by day leaves the clear impression that a small flotilla of submarines, covering the dead angles or the weakest faces of certain of the batteries, would have sufficed to make the attack a failure, or would have prevented a commander from attempting it and facing the risks; so that defence by submarines has this advantage over forts: that no matter how powerful these may be, the fact of the known presence of submarines might deter the enemy from making any attack.

Operations of Landing Troops at Bizerta.—The landing operations before Bizerta on the 21st July make clear the following points:—

1. The serious losses which a flotilla of submarines could inflict by day on an enemy's fleet attempting to disembark troops and remaining to cover and support the landing.
2. The useful support that can be given to the defence by night by a well-commanded flotilla of torpedo-boats.

The advantageous use of torpedo-boats by night was shown also before Toulon on the 25th July, when the 2nd Squadron, taking refuge in the

port, covered its retirement from the attacks of the 1st and 3rd Squadrons by a screen of torpedo-boats. In these operations three attacks by torpedo-boats before Bizerta and five attacks before Toulon were considered to have been successful.

Success of Submarine Attacks Before Bizerta and Marseilles.—These attacks took place on 17th and 31st July and 2nd August. The submarines were successful twice each on an average on the first two days, and three times on the third day in reaching without being discovered a position for firing their torpedoes at the ships.

Causes of Success of Submarines.—Doubts have been thrown on the reality of these successes, both at home and abroad, there being an impression that the exposure of the periscope would always cause the approach of a submarine to be detected in time for the ships to avoid the attack by rapid manœuvres. One suggested manœuvre is that of steaming away from the submarine when sighted at full speed before she is close enough to fire her torpedo; another is to steam straight at the assailant, so as to prevent her from firing by forcing her to dive quickly to avoid a disastrous collision. Of these two manœuvres, however, only the first is at all prudent, and this only under certain conditions; the second plan, though provided for by the new tactics, is of very doubtful practicability, and may easily lead to disaster, as it undoubtedly exposes the ship attempting it to the risk of being torpedoed if she does not afterwards succeed in turning tail quickly to her redoubtable little adversary. Moreover, if the torpedo had been discharged before the submarine was forced to dive, it is possible the ship might run into it with sufficient force to explode it.

It is, however, evident that neither of the above manœuvres can be attempted till the periscope, which alone betrays the presence of a submarine, has been observed, and our future adversaries will do well not to count too much on this warning. Each of our submarines is now practised and fitted in such a manner as to show the periscope as little as possible. As at first fitted, the periscope was a fixture, and could only be exposed or submerged by the rising or descending of the boat itself; the new fittings allow the commander, while advancing, to expose or withdraw the instrument without altering the depth of the boat. He thus has only to expose its extreme end from time to time to correct his direction till he arrives within striking distance. The degree of aptitude of a commander of a submarine may consequently be measured by his success in remaining invisible up to the moment of attack.

There is still, it is true, the chance that the torpedo itself may not run straight, or fail to explode; but the discharging of a submerged torpedo from a submarine is much more certain than from a torpedo-boat on the surface, where it is subject to the movements of the vessel, and also to deviation due to striking a wave at the moment of discharge.

As for rough weather preventing submarines from acting for the defence of a port against a raid, this applies equally to ships attempting to land troops; and moreover, if bad weather affects her surface navigation, this is not the case when submerged, when the submarine can lie-to very comfortably almost unaffected by the state of the sea in a position to await a suitable moment for making an attack.

As for the ships of a fleet engaged in a bombardment, the necessity for turning at a prescribed distance and uniform and moderate speed when passing the front of the batteries so as to ensure accuracy of fire, gives a great opportunity to the submarine, invulnerable as she is to all projectiles, and moreover, such attacks cannot be guarded against by a screen of destroyers, as in the case of torpedo-boats.

Uses of Submersibles.—For defensive operations along a stretch of coast at a distance from a port, the Admiral recommends the employment of destroyers and submersibles, the latter having good surface sea-going qualities, power to carry a number of the largest torpedoes, and by reason of their greater displacement and radius of action being able to take up a position on the route between ports where they can lie in ambuscade and await the passage of the enemy. Independent divisions of sea-going submersibles, supported by destroyers, might also be distributed in well-chosen positions off the coasts of France, Corsica, Algeria, and Tunis, whence, in case of war, they could be despatched on cruises extending up to the enemy's ports in the North Sea, the Channel, and the Eastern Mediterranean; our squadrons of heavy ships would then be at liberty to attack the enemy on the high seas and along the trade routes, free from the danger of being blockaded in our own ports by the enemy's submersibles.

The Admiral concludes this part of his report by remarking that with such a fleet, suitable for both offensive and defensive warfare, he believes with wise action on the part of our diplomatists so high a price would be placed on the friendship of the French Republic—notably by England and the United States—that there would be little danger of war.

He foresees that in the discussion that will be raised on the Navy in Parliament, the armoured battle-ship will be pitted against the submersible and submarine. It is therefore opportune to state that, far from being in opposition to each other, these two types of vessels in the present condition of naval warfare are, from their dissimilarity, all the more necessary to each other for mutual support, and he particularly advises the pushing on of the construction of flotillas of submarines as fast as possible, which, on account of her maritime and strategical position, are more necessary to France than almost any other nation.

Submarine Mines.—The Admiral advises the provision of special mine dredging vessels at all chief ports for clearing the entrances of blockading mines that might be dropped by the enemy; also that destroyers and light vessels (if special vessels are not provided) should be fitted with appliances for dropping blockading mines off the enemy's ports, such mines being so constructed that they can be quickly made safe if required, in view of their danger to neutrals.

Conclusion.—The report concludes with remarks on the battle-practice firing of the fleet at three specially constructed targets representing, on a slightly reduced scale, the side of a small coast-defence battle-ship. The ships opened fire on the first target rather too soon, and the thick smoke caused by the bursting of a number of heavy shells striking the water almost obscured the targets, and greatly reduced the percentage of hits. There are also remarks on the rapid coaling of the ships, but no special details, and on the satisfactory conduct of the reservists and seamen of the fleet. The total number of men embarked was about 14,000, and though as much leave as possible was given there was no leave breaking.

The Arsenal of Brest (Serious Condition).—The following article on the state of affairs existing at the Brest dockyard appeared recently in the *Temps*:—"The red syndicate of workmen in Brest Arsenal is abusing the patience of the public. The attitude taken up by the delegates at their recent interview with M. Thomson, Minister of Marine, is preposterous.

The first matter introduced was that of wages, and in principle it is natural for the workmen to wish to better their position; but the red syndicate is insatiable, and cynically puts forward quite inadmissible demands. These dockyard workmen have been quite spoilt of late.

Each year, on the proposition of different Ministers of Marine, Parliament has voted an increase of wages for the *personnel* of the dockyards, amounting on an average to 300,000 francs (£12,000). In 1903 the working hours, which had been 9½, were reduced to 8. In 1902 the Chamber voted a resolution for the suppression of piece work, substituting another system, and M. Pelletan afterwards abolished piece work altogether. The workmen's syndicates have been officially recognised, and orders issued to the naval authorities to enter into communications with them. M. Pelletan further admitted the right of workmen to receive their wages when holding municipal appointments, and as a natural result these men take advantage of the order to attend less at their work in the arsenal and more at the municipal offices.

Workmen who go out of their way to attend meetings for the purpose of evolving new claims (that is to say, to prepare action against the State which pays them) are paid just the same while attending these functions, which are not precisely of public utility.

Wages have also been paid during strikes, so that, in fact, the Government and the Chambers have shown these workmen a paternal benevolence bordering on extreme weakness.

How has the red syndicate shown its gratitude? By terrorising the town of Brest with continual disorders, insulting the *préfets-maritimes*, the officers of the fleet and engineers of the dockyard, and methodically organising idleness and *farniente*. Our eminent correspondent, M. Edouard Lockroy, has shown in this journal, supporting his statements with facts and figures, that all shipbuilding in our arsenals takes much longer and costs more than in foreign dockyards or private yards. This may be chiefly charged to the actions of the red syndicate. Its mouthpiece, citizen Muller, bluntly sums up its aims as follows: "Less work and more pay." Less work! and these workmen now only honour the arsenal with their presence for 8 hours, during which they are careful not to overwork themselves; they submit to very little supervision, and demand to be allowed to work without any at all. At this rate they will soon be employing their time in reading novels and playing bridge. M. Thomson made them a proposal to reintroduce a modified system of piece work which would have increased their earnings, but they refused to even consider the matter—what they demand is the right to be idle.

This is not all; the best thing is that these men, who live by working for the defence of the country, are internationalists, anti-militarists, Hervéists, and mortal enemies of the country which nourishes them; and M. Thomson was justly indignant after he had read and condemned an odious anti-patriotic notice signed by citizen Pengam, dockyard workman, and which at this moment is posted on the walls of Brest. In this placard it is stated that "Country is only a word used to veil the interests of financiers, capitalists, and Government officials, and the barracks are schools of slavery," etc. A telegram, also posted on the walls of the town, was noticed by M. Thomson, which announces to the dockyard workmen that citizen Lavy, delegate to the general confederation of working men, and victim of a Clemencist plot, will tell us for whom they are robbing us and killing us, and for what purpose are the barracks and murder dens, and how we are to prevent human butchery. If these members of the syndicate are killed, it certainly will not be by overwork. The Minister of Marine, justly scandalised, tried to make them understand the absurdity and indignity of such conduct, but without success; the delegates of the syndicate coolly replied that everyone had a right to his own opinions, and as for defending the country, no one must count on them to do it.

Truly such a situation is intolerable; will the Chamber stand it any longer? Will it decide on taking the necessary measures for the nation's security?"—*Le Temps.*

GERMANY. — *Estimates for 1906 (continued).* — The *matériel* of the fleet, including ships under construction, is made up as follows: — Battle-ships, 37, to be increased to 38 in accordance with Navy Act of 1900. Of these there are 18 first-class battle-ships completed, 4 in different stages of completion (2 since completed and commissioned), 2 to be launched this year (since launched), and 2 to be laid down; 3 third-class battle-ships and 8 fourth-class; these last are rated as coast-defence ships, and are, with the third-class ships, to be replaced in due course by first-class vessels. Large cruisers: 15, to be increased to 20, in accordance with the enlarged programme of 1906. Of these there are 6 first-class armoured cruisers completed, 2 under construction (1 since launched), and 1 to be laid down this year. The remaining 6 are protected vessels.

Small cruisers: 37, to be increased to 38. Of these there are 27 completed, 4 in different stages of completion (2 since completed), 4 under construction (2 since launched), and 2 to be laid down this year.

Details of smaller vessels are not given in the Estimates, but there are 7 first-class gun-boats and 5 river gun-boats, four of which are in China and 1 in East Africa.

The torpedo flotilla consists of 73 destroyers, of which 12 have been laid down this year. These vary in displacement from 300 to 570 tons; those laid down this year (12 in number) have the last-named large displacement, with a speed of 30 knots; they have light armoured protection for the vital parts, and their armament will consist of two 3·4-inch (19·8-pounders) Q.F. guns, and four 6-pounder Q.F. guns. There are in addition 31 sea-going torpedo-boats and 47 small ones.

The Training Squadron for cadets and boys consists of 6 sea-going cadet and boys' school frigates, and there are 6 gunnery training-ships, 1 torpedo school-ship, with 1 tender, and 2 submarine mine training-ships.

The Special Service ships are:—2 Imperial yachts, 3 surveying-ships, 1 stationaire at Constantinople, and a Fishery Protection vessel.

Shipbuilding Programme, 1906-1917.

Year 1st Vote.	Shipbuilding Programme.			Torpedo Boats.	Cost of Shipbuilding and Armament.	
	Battleships	Cruisers.				
		1st Class.	2nd Class.			
					Marks.	£
1906	2	1	2	2	117,000,000	= 5,850,000
1907	2	1	2	2	131,000,000	6,550,000
1908	2	1	2	2	136,000,000	6,800,000
1909	2	1	2	2	148,000,000	7,400,000
1910	2	1	2	2	148,000,000	7,400,000
1911	1	2	2	2	147,000,000	7,350,000
1912	1	2	2	2	144,000,000	7,200,000
1913	1	1	2	2	137,000,000	6,850,000
1914	1	1	2	2	126,000,000	6,300,000
1915	1	1	2	2	119,000,000	5,950,000
1916	1	1	2	2	112,000,000	6,600,000
1917	2	—	2	2	113,000,000	5,650,000
	18	13	24	24		

Cost of the Fleet.—The cost of the Fleet in Commission is distributed as follows :—

	1906. Marks.	£ s.	1905. £ s.
1. The Battle Fleet.			
Active Squadron	9,324,916 =	(466,245 16)	401,666 10
Reserve	694,848	(34,742 10)	34,610 8
Scouting Division	3,408,500	(170,425 0)	170,540 14
Torpedo Flotillas	2,830,230	(141,151 10)	93,580 6
Total	16,258,494	(812,564 16)	700,397 18

Showing an increase of 2,250,536 marks (£112,166 18s.), as compared with last year.

2. Ships on Foreign Stations.			
The China Station	4,777,680	(238,884 0)	240,283 4
The Australian Station	500,424	(25,021 4)	25,117 4
The West African „	241,536	(12,076 16)	15,265 4
The East African „	256,524	(12,826 4)	24,889 4
The American „	962,316	(48,115 16)	82,420 16
Constantinople Stationaire	86,532	(4,326 12)	3,738 12
Surveying Duties	225,666	(11,283 .0)	7,247 8
Total	7,050,678	(352,533 12)	398,961 12

Showing a decrease of 928,554 marks (£46,328), as compared with last year.

3. Training Ships.			
Cadets' and Boys' Training Ships	1,080,180	(54,009 0)	53,892 0
Gunnery School Ships...	2,159,014	(107,950 14)	76,194 0
Torpedo School Ships	932,303	(46,615 8)	44,481 17
Submarine Mining	166,685	(8,334 5)	4,273 10
Coast Pilotage	50,793	(2,539 13)	2,483 4
Total	4,388,980	(219,449 0)	181,324 11

Showing an increase of 762,489 marks (£38,124), as compared with last year.

4. Special Service Ships.			
Imperial Yacht "Hohenzollern"	365,304	(18,265 4)	18,805 16
Surveying Ships (Home Waters)	36,750	(1,837 10)	1,749 0
Torpedo Experimental Ship	732,684	(36,634 4)	42,436 16
General Experiments	181,728	(9,086 8)	9,194 8
Fishery Protection	122,800	(6,140 0)	8,360 6
Total	1,439,266	(71,963 6)	80,546 6)

Showing a decrease of 171,660 marks (£8,583), as compared with last year.

5. For Special Purposes...	875,378 =	(43,768 18)	45,037 11

	Combined Total.		
Battle Fleet	16,258,494	(812,924 14)	700,397 18
Foreign Service	7,050,678	(352,533 18)	398,961 12
Training Ships...	4,388,980	(219,449 0)	181,324 11
Special Service Ships	1,439,266	(71,963 6)	80,546 6
Special Purposes	875,378	(43,768 18)	45,037 11
Total ...	30,012,796	(1,500,639 16)	1,406,267 18

Showing an increase of 1,887,438 marks (£94,371 18s.), as compared with last year.

—*Etat für die Verwaltung der Kaiserlichen Marine, 1906.*

Changes in the Organisation of the Torpedo Personnel.—The following Order has been published :—

1. The 1st Torpedo Division at Kiel will be formed by the 1st Torpedo Battalion, and the 2nd Division at Wilhelmshaven by the 2nd Torpedo Battalion.

2. Each of the two torpedo divisions will consist of 2 battalions, each of 2 companies.

3. The commandant of a torpedo division will be invested with the same powers—jurisdiction, discipline, etc.—as the commandant of a division of seamen, and the commandant of a torpedo battalion with the same powers as the commandant of a battalion of a division of seamen.

4. The cap ribbons of the men of the torpedo divisions will have the inscription "Torpedo Division," with the number of the division in Roman numerals, and the number of the company in Arabic. The inscription will be in gilt characters for the seamen *personnel*, and in aluminium for the engine-room *personnel*.

The naval staff of a torpedo division will consist of a captain or frigate-captain, with a lieutenant, sub-lieutenant, a principal medical officer, a principal engineer, and principal accountant officer. The staff of a battalion will consist of a corvette-captain, a sub-lieutenant, a principal medical officer, a principal engineer, and an accountant officer.

Each company will be commanded by a lieutenant, with a sub-lieutenant as his company officer.

The changes in the new torpedo organisation took effect from the 1st October this year. The headquarters of the 1st Division will be at Wik, near Kiel, and of the 2nd Division at Wilhelmshaven. A further Imperial Order directs that for the future the divisions of torpedo-boats (6 boats) will be styled "Half Flotillas."

The 1st Battalion of the 1st Torpedo Division at Kiel will be formed of the 1st and 3rd Torpedo Companies, and the 2nd Battalion of Nos. 5 and 7 Companies. The 1st Battalion of the 2nd Torpedo Division at Wilhelmshaven will be composed of Nos. 2 and 4 Companies, and the 2nd Battalion of Nos. 6 and 8 Companies.

The 1st and 2nd "Half Flotillas" will be manned by the 1st and 2nd Companies, at Kiel and Wilhelmshaven respectively, and will form the "Exercising Flotilla"; the 3rd and 4th "Half Flotillas" will be manned by the 3rd and 4th Companies at Kiel and Wilhelmshaven, and will form the "Reserve Flotilla." The 5th and 7th "Half Flotillas" will be manned by the 5th and 7th Companies at Kiel, and will form the 1st School Flotilla, while the 6th and 8th "Half Flotillas" will form the 2nd School Flotilla, and be manned by Nos. 6 and 8 Companies at Wilhelmshaven.

Changes in the Training of Boys.—The eighteen months' training period of boys, which is at present in force, has not proved as successful as was hoped in giving the boys, who, as a rule, enter at the age of 15¼ years, as high a seamanship and *moral* training as is desired. It has therefore been determined from next October to extend the period of training to two years. In view of the steady increase in the demand for gun specialists, necessitating the entry of a larger number of boys, a fourth sea-going training-ship is to be commissioned for service in the spring of next year. This vessel will be the "Freya," a comparatively speaking modern cruiser of 5,880 tons, and is the first modern ship to be used for the purpose. She will have on board 45 cadets and 150 boys

for training. In accordance with the increased demand, 850 boys will join on the 1st October next; their first six months of training will be devoted to a preliminary grounding in the different branches of their education; the next year will be spent on board the sea-going training-ships, and the last six months in a further course of artillery and infantry training.

The distribution of the Recruits for 1906.—The following Order relative to the incorporation of the recruits for 1906 has been promulgated :—

In the Seamen's and Artificers' Divisions : 3rd October, 1906, and 10th January, 1907.

In the Torpedo Divisions, the Mine Companies, the Repair and Store Departments, the 3rd Depôt Battalion of Marine Infantry, the Depôt Division of the Kauo-Chau Marine Artillery, on the 3rd October, 1906.

In the Marine Artillery Divisions and the 1st and 2nd Marine Infantry Battalions, on the 3rd November, 1906.

1. *Seamen Divisions.*—The effectives for the Seamen Divisions for 1906 number 16,434 men, and have been fixed for 1907 at 17,512 men (including warrant officers), of whom 8,470 and 8,991 are allotted to the 1st Division, and 7,964 and 8,571 to the 2nd Division respectively.

The boys, who will be rated seamen, whose number will be 468 this current year and 480 in 1907, will be divided between the Seamen's Divisions, 80 being allotted to the Torpedo Divisions.—*Marine Rundschau* and *Neue Preussiche Kreuz Zeitung.*

JAPAN.—Admiral Togo has been appointed Chief of the General Staff of the Navy; Admiral Ito, whom he succeeds, has been nominated a member of the Supreme Council of War. Admiral Yamamoto has been replaced as Minister of Marine by Vice-Admiral Saïto, the Vice-Minister; and Rear-Admiral Kabo, late Chief of the Staff to Admiral Togo, has been appointed Vice-Minister. Admiral Yamamoto will continue, probably, according to Japanese customs, to more or less superintend the work of the Ministry; like Admirals Ito and Mouye, he has been appointed a member of the Supreme Council of War.

Strength of the Officer Personnel.—According to the latest official Navy List, the Japanese Corps of Naval Officers consists of 7 admirals, 23 vice-admirals, 26 rear-admirals, 99 captains, 146 frigate-captains, 192 corvette-captains, 342 captain-lieutenants, 320 senior lieutenants, and 268 lieutenants; in all, a strength of 1,423. Of midshipmen and cadets there are 176. The proportion of the different grades to the whole strength is as follows :—Flag-officers, 3·9 per cent; captains, 7; frigate and corvette-captains, 23·8; captain-lieutenants, 24; senior lieutenants, 22·5; and lieutenants, 18·8 per cent. The mean age of admirals is 56 years 5 months; of vice-admirals, 52 years 10 months; of rear-admirals, 50 years; and of captains, 44 years 3 months. The youngest admiral, Prince Arisugawa, is 44 years 1 month old; the oldest, Admiral Ito, is 62 years 9 months, while Admiral Togo is 58 years 2 months. Of the vice-admirals, the eldest is 57 years 11 months, and the youngest, 45 years 11 months; of the rear-admirals, the eldest is 55 years 6 months, and the youngest 45 years; of the captains, the eldest is 52 years 6 months, and the youngest 38 years 8 months.

Strength of the Fleet.—It is reported that the strength and composition of the Japanese Fleet is to be as follows:—

Two squadrons of 8 battle-ships each, with 4 stand-by units, or a total of 20 battle-ships.
Two squadrons of 8 armoured cruisers each, with 4 stand-by units, or a total of 20 armoured cruisers.
8 cruisers of over 22 knots.
8 scouts of 25 knots.
100 destroyers.
8 river gun-boats.
And a certain number of submarines, the number of which has not yet been settled.

The *personnel* of the 13,600-ton armoured cruisers of the "Ikoma" class has been settled as follows:—

Captain and officers	33
Midshipmen and warrant officers	17
Petty officers	140
Seamen, etc.	627
Total	817

Wireless Telegraphy.—All the ships of the Japanese Navy are now fitted with wireless telegraphy, including destroyers; these latter vessels not only have receivers, but they can also send messages.

The wireless telegraph apparatus in use is the result of the experiments and combined work of Engineer Kimura, Captain Tonami, Imperial Navy, and Engineer Matsushiro, attached to the Ministry of Communications, who commenced their studies in 1900.

Since 1902, the three collaborators, after having studied all the systems in Europe and America to which they could obtain access, have obtained with the apparatus produced by themselves, results which they claim to be superior to those from other systems in use abroad, and their apparatus has been adopted and installed on board all the Japanese ships.

Further, Engineer Kimura is also the inventor of a wireless telephone, which has proved sufficiently practical for use on board ships, and is also in use on board Japanese war-ships.

Launch.—The new first-class battle-ship "Satsuma" was launched on the 15th ult. from the Imperial Dockyard at Yokosaka, her first keel plate having been laid on the 15th May of last year. Her dimensions are believed to be as follows:—Length, 480 feet 6 inches; beam, 82 feet 9 inches; displacement, about 19,000 tons, with a draught of 26·2 feet. She is to have turbine engines to develop 25,000-I.H.P., giving a speed of 20 knots. Her armament is to consist of four 12-inch guns, ten or twelve 10-inch guns, twelve 4·7-inch and several smaller Q.F. guns, with five torpedo-tubes, four of them submerged. A sister-ship, the "Aki," is under construction in the Imperial Dockyard at Kure.

New Ships.—It is reported that the two new battle-ships of this year's programme are to have a displacement of 21,000 tons, with slightly increased dimensions; the turbine engines are to develop 26,500-I.H.P., to give the same speed as in the "Satsuma," the armament also remaining the same.

It is further reported that the two new armoured cruisers are to be 537 feet long, with a beam of 79 feet 6 inches, and a displacement of 18,650 tons. The turbine engines are to develop 44,000-I.H.P., giving a speed of 25 knots, while the armament will consist of four 12-inch guns, eight 10-inch guns, and ten 4·7-inch guns. All the new ships are to be fitted with the Miyabara type of water-tube boilers.

The dimensions of the new second-class protected cruiser "Tone," under construction at the Sasebo Yard, are reported to be as follows:—Length, 403 feet 6 inches; beam, 48 feet; displacement, 4,100 tons, with a draught of 16 feet 6 inches. The engines, which will be reciprocating, are to develop 15,000-I.H.P., giving a speed of 23 knots, steam being provided by 16 Miyabara water-tube boilers. The armament will consist of two 6-inch, ten 4·7-inch, and two 3-pounder Q.F. guns. There will be an armoured deck 3-inch to 1·5-inch thick, with a 4-inch conning-tower. There are also under construction at the Mitso-Bischi Yard, at Kobe, two despatch-vessels of 1,350 tons displacement, to have a speed of 23 knots, one, the "Mogami," to be fitted with Parsons' turbines, and the other, the "Yodogawa," to have the ordinary reciprocating type.

The Training of Cadets.—The midshipmen and first-class cadets, who left the naval school in November, 1903 and in 1904, were unable to have the usual instruction cruise, as, owing to the war, they were immediately embarked in the sea-going fleet. There was, consequently, a break in their course of instruction, and the young officers in question are now to be distributed between the three cruisers attached to the training schools and the permanent auxiliary cruiser "Anekawa Maru," of the 1st Squadron, which has been detailed for that duty.—*Marine Rundschau* and *Revue Maritime.*

United States.—*Review of the Fleet by the President.*—On 3rd September, President Roosevelt inspected the United States Atlantic Fleet, the most powerful fleet of American vessels ever assembled. The President was on board the yacht "Mayflower." The day opened badly, but before the review commenced it cleared, although a nasty sea remained running.

The fleet consisted of 12 first-class battle-ships, 4 first-class armoured cruisers, 4 protected cruisers, 4 monitors, 2 torpedo flotillas, 2 submarines, and some auxiliary vessels, in all, a total of 47 vessels, manned by 812 officers and 15,235 men, and carrying 1,178 guns. Of the guns there were twenty 13-inch, thirty-eight 12-inch, seventy-three 8-inch, twelve 7-inch, one hundred and fifty-eight 6-inch, sixty-six 5-inch, twenty-two 4-inch, and 779 of smaller calibre. The fleet was anchored in three columns, running from east to west, off Oyster Bay. Each vessel had an interval of 450 yards, and each of the outside columns a distance of 450 yards from the centre column. The fleet was under the command of Rear-Admiral R. D. Evans, who had his flag flying on board the first-class battle-ship "Maine."

The fleet was composed as follows:—

Centre Column (2nd).

First-class Battle-ships.—"Maine" (flag-ship of Commander-in-Chief), "Missouri," "Kentucky," "Kearsarge," "Louisiana," "Rhode Island," "New Jersey," "Virginia."

Monitors.—"Puritan," "Nevada," "Florida," "Arkansas."

First Column (Starboard).

First-class Battle-ships.—"Alabama" (flag-ship of Rear-Admiral Davis), "Illinois," "Indiana," "Iowa."

First-class Armoured Cruisers.—"West Virginia" (flag-ship of Rear-Admiral Brownson), "Colorado," "Maryland," "Pennsylvania."

Protected Cruisers.—"Minneapolis," "Tacoma," "Cleveland," "Denver."

Third Column (Port).

This column was made up of the torpedo flotillas, which consisted of 6 destroyers and 6 sea-going torpedo-boats, with 2 submarines.

Navy Target Practice.—The Department publishes for the information of the Service the standing of the fleets, squadrons, divisions, and vessels in the annual record target practice of 1906 :—

Final Merit of Fleets and Stations.

These figures include every vessel (giving assigned weights).

1. Asiatic Fleet, 110·127.
2. Atlantic Fleet, 96·665.
3. Pacific Squadron, 95·790.

Final Merit of Squadrons.

1.	Battle-ship Squadron, Asiatic Fleet—"Wisconsin," "Ohio"	121·987
2.	Cruiser Squadron, Asiatic Fleet—"Baltimore," "Raleigh," "Cincinnati"	111·889
3.	First Squadron, Atlantic Fleet — "Missouri," "Kearsarge," "Kentucky," "Indiana," "Illinois," "Alabama," "Maine," "Iowa"	104·533
4.	Pacific Squadron—"Perry," "Chicago," "Paul Jones," "Boston," "Princeton," "Marblehead"	95·790
5.	Philippine Squadron, Asiatic Fleet—"Pampanga," "Rainbow," "Paragua," "Arayat," "Frolic"	88·683
6	Coast Squadron, Atlantic Fleet—"Nevada," "Arkansas," "Texas," "Rodgers," "Florida," "Blakely," "Porter," "Nicholson," "Dupont"	81·696

Final Merit of Sub-divisions of Squadrons.

1.	First Division, Atlantic Fleet—"Missouri," "Kearsarge," "Kentucky," "Maine"	115·292
2.	Fourth Division, Atlantic Fleet—"Colorado," "Maryland," "Pennsylvania," "West Virginia"	104·749
3.	Second Division, Atlantic Fleet—"Indiana," "Illinois," "Alabama," "Iowa"	93·767
4.	Coast Squadron without torpedo-boats—"Nevada," "Arkansas," "Texas," "Florida"	92·429
5.	Pacific Squadron without destroyers—"Chicago," "Boston," "Princeton," "Marblehead"	91·415

Final Merit of Torpedo Flotillas.

1.	Destroyers attached to Pacific Squadron—"Perry," "Paul Jones"	115·474
2.	Second Flotilla attached to Atlantic Fleet—"Truxtun," "Hopkins," "Stewart," "Lawrence," "Macdonough," "Worden"	68·070
3	Third Flotilla attached to Coast Squadron—"Rodgers," "Blakely," "Porter," "Nicholson," "Dupont"	61·986

Final Merit of Single Vessels.

(*Star ships are those that attained 85 per cent. of the final merit of the trophy winner. †Trophy winner.)

Vessels Competing for the Battle-ship Trophy.

1.	†"Wisconsin"	137·925	9.	"Alabama"	110·234
2.	*"Missouri"	128·830	10.	"Ohio"	106·049
3.	*"Kearsarge"	125·791	11.	"Pennsylvania"	105·448
4.	*"Kentucky"	123·060	12.	"Texas"	90·537
5.	"Colorado"	113·155	13.	"West Virginia"	87·903
6.	"Maryland"	112·490	14.	"Maine"	83·515
7.	"Indiana"	112·358	15.	"Iowa"	41·514
8.	"Illinois"	110·960			

Vessels Competing for the Cruiser Trophy.

1.	†"Baltimore"	141·102	4.	"Boston"	84·580
2.	"Chicago"	114·970	5.	"Cincinnati"	76·063
3.	"Raleigh"	103·897	6.	"Marblehead"	72·773

Vessels Competing for the Gun-boat Trophy.

1.	†"Dolphin"	144·762	7.	"Paragua"	83·036
2.	"Pampanga"	115·190	8.	"Arayat"	82·285
3.	"Nevada"	107·293	9.	"Princeton"	81·561
4.	"Arkansas"	98·652	10.	"Wolverine"	80·727
5.	"Mayflower"	85·041	11.	"Frolic"	78·552
6.	"Rainbow"	84·350	12.	"Florida"	74·182

Vessels Competing for the Torpedo Trophy.

Guns and Torpedoes.

1.	†"Perry"	117·230
2.	*"Paul Jones"	113·718
3.	*"Truxtun"	112·888
4.	"Preble"	93·802
5.	"Rodgers"	80·858
6.	"Hopkins"	70·367
7.	"Stewart"	66·147
8.	"Blakely"	65·713
9.	"Porter"	62·280
10.	"Lawrence"	59·442
11.	"Macdonough"	55·939
12.	"Nicholson"	54·821
13.	"Dupont"	48·258
14.	"Worden"	43·637

Guns Alone.

1.	"Paul Jones"	124·955
2.	"Lawrence"	118·884
3.	"Stewart"	112·884
4.	"Perry"	109·465
5.	"Preble"	108·414
6.	"Truxtun"	107·767
7.	"Rodgers"	92·850
8.	"Dupont"	83·565
9.	"Macdonough"	79·270
10.	"Hopkins"	52·228
11.	"Worden"	47·678
12.	"Blakely"	43·918
13.	"Nicholson"	35·283
14.	"Porter"	27·855

Torpedo Alone.

1.	"Perry"	124·995
2.	"Truxtun"	118·008
3.	"Paul Jones"	102·480
4.	"Hopkins"	88·506
5.	"Preble"	79·189
6.	"Rodgers"	76·860
7.	"Porter"	73·755

Torpedo Alone.

8.	"Blakely"	72·978
9.	"Nicholson"	61·333
10.	"Worden"	39·595
11.	"Dupont"	36·489
12.	"Macdonough"	32·607
13.	"Stewart"	19·409
14.	"Lawrence"	00·000

The New Battle-ships, "South Carolina" and "Michigan."—The recent letting of contracts for the construction of the two new battle-ships "South Carolina" and "Michigan" to the Cramp Ship and Engine Building Company and to the New York Shipbuilding Company, has brought these two formidable vessels into special prominence, and a description of the leading features of their design will be timely.

Particular interest attaches to these vessels because of the fact that they are the first battle-ships to be designed by our Navy Department subsequently to the conclusion of the Russo-Japanese War, and that in their design they embody the valuable experience gathered during that great conflict. The most marked feature is the complete elimination of the intermediate battery, which in our earlier ships consisted of a large number of 5-inch, 6-inch, or 8-inch guns. The customary number of guns in the main battery has been doubled, so that instead of four 12-inch carried in two turrets, the new ships have eight such guns mounted in four turrets. The numerous battery of small rapid-fire guns is retained, since its service will always be necessary for the repelling of torpedo-boat attack. In length and displacement the new vessels are approximately the same as their predecessors, the "Louisiana" and "Connecticut," though with greater beam and ½ knot more speed. They are also more effectively armoured than those ships, and in fighting power they are believed to be vastly superior; that is to say, if the new theories as to the probable tactics of future naval conflicts prove to be correct.

The general dimensions of the vessels are as follows:—The length on the load water-line will be 450 feet; the breadth is greatly increased over that of the "Connecticut," being 80 feet 2½ inches. The mean draught at trial displacement must not exceed 24 feet 6 inches, on which draught the displacement must be 16,000 tons.

The General Appearance of the New Battle-Ships.

The two ships when completed will, in appearance, be distinctly different from any of our other battle-ships. The most noticeable feature, of course, will be the four 12-inch turrets and their guns, mounted in pairs on the axial line of the ship, two forward and two aft of the superstructure. The doubling up in the number of 12-inch turrets, and the placing of them one ahead of the other, has necessarily shortened the length of the superstructure, and crowded the masts, smokestacks, etc., into a shorter space amidships, a fact which is readily noticeable on looking at the engraving of the new ships. In order to save weight the freeboard of the ship has been reduced by the depth of one deck, or about 8 feet, from aft of the superstructure to the stern. Hence the "South Carolina" and "Michigan," while they will have the same freeboard forward as the "Connecticut" and "Louisiana," will have a lower freeboard by about 8 feet throughout the after third of the vessels' length. The most forward pair of 12-inch guns is carried at about the same height as the 12-inch guns of the "Connecticut," or say about 24 feet above the water-line. Immediately abaft of these is the second pair of forward 12-inch guns, which are so mounted as to fire clear across the roof of the forward turret, the barbette for these guns being increased in height by about 8 feet in order to give the requisite elevation. The guns have the great command of 32 feet above the water-line. The after pair of turrets with their four guns are mounted similarly, although at an elevation in each case 8 feet lower than that of the forward guns.

The shortening of the superstructure has been accompanied also by a moving of the two military masts toward the centre of the vessel, and a distinct novelty is seen in the placing of these masts, not on the longitudinal axis of the ship, but diagonally, the forward mast being moved over to starboard and the mainmast to port. Advantage is taken of this new position to mount the boat cranes on these masts, with, of course, a considerable saving of weight.

Armour and Armour Protection.

The armour protection has been exceedingly well worked out, and forms one of the most commendable characteristics of these vessels. Its most important element is a water-line belt 8 feet in width, and more than 300 feet in length. The midship portion of the belt varies in thickness from 11 inches at the top to 9 inches at the bottom, while that in the wake of the magazine is 12 inches thick at the top and 10 inches at the bottom. The casemate side armour above this water-line belt is nearly 300 feet long; it will be 8 inches thick at the top, 10 inches at the bottom, and will be about 8 feet 1 inch wide amidships. This is a casemate protection, which, in extent and in thickness, has never been approached in our previous battle-ships. Triangular athwartship armour, 10 inches thick, will be fitted at the after end of the belt armour, between the slope of the protective deck and the extension of the flat protective deck. Also an athwartship armour bulkhead, extending entirely across the ship between the upper platform and the protective deck, will be fitted at the forward end of belt. This will be 10 inches thick throughout. Furthermore, an athwartship casemate armour bulkhead will be fitted between the shell plating and the barbettes between the berth and main decks at forward and after ends of casemates; this will be 8 inches in thickness throughout.

Barbette Armour.

The forward barbette extends from the protective deck to about 4 feet above the upper deck, and it varies in thickness from 10 inches to 8 inches, according as it is flanked by the side armour of the ship. The after forward barbette extends to a height of about 12 feet above the upper deck, and carries the same general thickness of armour. The forward after barbette extends from the protective deck to 12 feet above the main deck, and the barbette aft of this extends from the protective deck to 4 feet above the main deck. In the case of each of the four turrets, the port plate will be 12 inches in thickness, the rear and side plates 8 inches, and the top plates 2½ inches in thickness.

The vessels will be propelled by vertical twin-screw four-cylinder triple-expansion engines of 16,000 horse-power. The steam pressure will be 265 pounds in the high-pressure valve chest, and the revolutions per minute will be 125. Steam will be supplied by twelve water-tube boilers fitted with superheaters, carried in three water-tight compartments. The vessels will be lighted throughout by electricity, and the operation of the turrets, ammunition hoists, and, indeed, most of the mechanical work throughout the ship, will be performed by electrical power. The coal bunkers will be arranged with a direct reference to the rapid and efficient supply of coal to the fire rooms, and with especial reference to efficient water-tight subdivision of the vessel. There will be provided for coaling the ships not less than five winches, ten booms, wire spans, with the

necessary whips at all the usual chutes and other openings, special provision having been made for the rapid coaling of the vessels. There will be a bridge both forward and aft, built according to the latest practice. The masts will be fitted with searchlight platforms, and arranged for wireless telegraphy. There will be one signal yard on each mast, a battle gaff on the mainmast, and a lookout platform on the foremast.

Distribution of Weight.

It is instructive to study the distribution of weights in these new vessels; the guns, mounts, ammunition, and ordnance stores will represent about 7 per cent. of the trial displacement; the motive power, including engines, boilers, piping, etc., about 10 per cent., and the total armour protection reaches the great figure of more than 25 per cent of the trial displacement.

Concentration of Fire.

It will be seen at once that by arranging the two extra pairs of 12-inch guns at a sufficient height to enable them to be fired across the roofs of the adjoining turrets, the theoretical all-round concentration of fire is remarkably powerful. Forward, when in pursuit of the enemy, or when fighting in the end-on position, it will be possible to concentrate four 12-inch guns, which is double the number that can be trained in a similar direction on the "Connecticut" and "Louisiana." Aft there is a similar concentration of four 12-inch guns, while on the beam these ships will be able to train eight 12-inch guns.

In a previous issue of the *Scientific American*, we have criticised this method of placing the armament, on the ground that previous experience with the "Oregon" and her class showed that if heavy guns were fired across the roofs of the adjoining turrets, the work of the gun crews in these turrets would be seriously interfered with. We are informed, however, that particular attention has been given by the Navy Department to this difficulty, and that by virtue of the improved sighting ports and the closely-fitting port shields employed, and other arrangements, it will be possible, in an emergency, to fire any of these 12-inch guns in any position of training without serious interference with the work of the other gun crews. If this should prove to be the case, our Navy Department will be the subject for congratulation on having produced, in proportion to their displacement, by far the most powerful fighting ships built or building in the world to-day; for it must be remembered that these vessels are of but 16,000 tons displacement, while the latest battle-ship designs of other Governments are of from 18,000 to 19,000 tons displacement.

There are many novel details of construction in these vessels, which, for obvious reasons, it is not expedient to make public at the present time—such, for instance, as the more complete water-tight subdivision of the vessel, and provision against heeling due to damage in action; and the protection of the vessels' longitudinal strength when damaged by gun fire, the provision of adequate longitudinal strength being particularly important in view of the concentration of the weight of the barbettes and heavy guns so near the extremities of the ship.—*Scientific American.*

MILITARY NOTES.

HOME.—The following are the principal appointments which have been made:—

Lieut.-General—Sir C. C. Egerton, G.C.B., D.S.O., I.A., is promoted to the rank of General.

Major-Generals—L. W. Parsons, C.B., to Command the 8th Division; F. W. Kitchener, C.B., Commanding 3rd (Lahore) Division, is promoted to the rank of Lieut.-General. Sir E. L. Elliot, K.C.B., D.S.O., I.A., Commanding 8th (Lucknow) Division, to be Lieut.-General. J. E. Nixon, C.B., I.A., to be Inspector-General of Cavalry.

Colonels—C. A. Hadfield, from h.p., to be Assistant-Director of Supplies and Transport. A. Wilson, C.B., from h.p., to be an officer in charge of Infantry Records. E. J. Granet, from R.A., to be an Assistant-Director at Headquarters. R. I. Scallon, C.B., C.I.E., D.S.O., I.A., to be a Brigade Commander, and is granted the temporary rank of Brigadier-General while so employed. F. G. Atkinson, I.A., to be a Colonel on the Staff. R. D. Longe, from the Duke of Cambridge's Own (Middlesex Regiment), to be an A.A.G.

Committee's Report on Promotion to the Rank of Colonel and Major-General.—The report of the War Office Committee on Promotion to Colonel and General, the members of which were Major-General Sir Coleridge Grove (Chairman), Sir Frank T. Marzials, Major-General H. S. G. Miles, C.B., Brigadier-General C. G. Donald, C.B., Colonel (now Major-General) J. S. Ewart, C.B., and General Sir J. J. H. Gordon (India Office representative), with Mr. A. E. Widdows, and afterwards Mr. J. A. Rochford, both of the War Office, as secretaries successively, has been issued as a Parliamentary paper. The Committee were appointed to consider:—

1. The existing system of promotion of officers from the ranks of lieut.-colonel to colonel, and from colonel to general, and to report whether the system is satisfactory, and if not, in what manner it can be improved.

2. Whether, in view of the congested condition of the colonels' list, and of the difficulty under the present system of restricting its numbers, it is desirable to fix an establishment of colonels based on the requirements of the Service, and bearing a due proportion to the numbers fixed for the generals' list, and whether promotion to such list should be made by selection as vacancies occur.

3. Whether it is advisable to have an establishment of major-generals, and to promote by selection to fill vacancies on that establishment, in preference to the present system of selection to fill an appointment, and to have an establishment and a similar system of promotion in the ranks of lieut.-general and general.

4. At what numbers such establishments should stand; and—

5. Whether the effect of any proposals that may be made as suggested above render it desirable that the existing scale of pensions should be revised, and to consider and report the financial result of such proposals as regards effective and non-effective charges.

The Committee thus summarise their recommendations :—

a. That the automatic promotion of a lieut.-colonel to brevet colonel after three years' tenure of a lieut.-colonel's post or six years' full pay service be abolished. This, however, not to affect existing lieut.-colonels.

b. That promotion from lieut.-colonel upwards be by selection to fill a vacancy on an establishment.

c. That the establishments for the ranks above that of lieut.-colonel be as follows (Cavalry, R.A., R.E., Infantry, A.S.C.) :—

Colonels	350
Major-Generals	70
Lieut.-Generals	20
Generals	10

d. That these establishments be general for the whole Army, and be not sub-divided by arms.

e. That the principles of the recommendations for the combatant branches apply equally to the departments.

f. That the recommendations for the promotion of the whole Army, including that of the General Staff, be made by the Selection Board.

g. That some military members of the Army Council, including the Chief of the Staff, be added to the Selection Board.

In the concluding paragraph the Committee say :—

"If these proposals are adopted, they will do away with the present excess of colonels with its attendant disadvantages. And they will, we believe, remove many of the inequalities and difficulties of administration which have been found to accompany the existing system of promotion to the higher ranks, while keeping unimpaired the full power of selection and of choosing in all cases the officer most fitted for the post to be filled. But too much must not be expected from them. They will not prevent occasional hardship, nor will they ensure that in all cases the man who is thought to be the best, is so. Some hardship must always be inflicted, some heart-burning must always be felt, under any system of selection. And no method for effecting such selection can make certain that the officer picked out under a reasoned conviction that he is the best man available, will always answer to the expectations of those who chose him. To appraise accurately the qualifications of a man for a more important post than that which he occupies, is difficult and uncertain work in all callings. It is especially so in the Army, where the estimate has to be formed in peace, while the qualifications required are those for war. Interesting and instructive as have been the accounts given us by the heads of great civil institutions, of their methods of promotion, they do not help us as regards this problem. In these institutions the work of the higher post is an enlargement of that of the post below. In the Army, peace work and war work are different in kind. To choose a man for leadership in war on his peace performances is something like choosing a man to ride across country, on the way he manages a horse in a riding school. We may know that he possesses some of the necessary qualifications, but the higher gifts required, the nerve, determination, and judgment must remain unknown qualities. These can only be gauged by the strenuous test of actual war."—*Précis from The Times.*

AUSTRIA-HUNGARY.—*New Cavalry Journal.*—A new monthly military journal appeared in October last, under the title of *Kavalleristische Monatshefte.* It is published and edited, with the collaboration of a group of

officers, by Mr. Carl M. Danzer, the Chief Editor of the well-known and much appreciated *Danzer's Armee-Zeitung*. The *Kavalleristische Monatshefte* deals with cavalry questions in both peace and war. The present (the first) number contains many excellent articles by some of the best foreign military writers on "Cavalry in Modern Action (Königgrätz)," the "Training of Cavalry for Battle," the "Organisation of Cavalry in Independent Fighting Units," "Cavalry Impressions of the Imperial Manœuvres of 1906," the "Efficiency of the 3rd Cavalry Division at the Silesian Manœuvres." "Remount of the Prussian Army," "Foreign Cavalry," an account of the Liverpool Grand National, and some interesting notes on the purchase and training of officers' chargers, etc. Altogetner the *Kavalleristische Monatshefte* is a valuable addition of cavalry literature, and, judging by the present number, should have a brilliant future before it.

The Imperial Manœuvres in Silesia.—The *Revue Militaire des Armées Etrangères* for the month of November last contains an interesting account of these manœuvres, which concludes with the following criticisms and observations :—

Direction and Organisation.—As a general rule the fight commenced between 6 and 7 o'clock in the morning, and was stopped towards 10 a.m. by the Direction, which decided from that moment the success of one of the side and the retreat of the other. This precipitation compels the two commanders to shorten their operations, and completely warps the development of the battle. In order that all the troops may begin to rest at about 1 p.m., it is necessary to break off the manœuvre early; in the short space of time left to commanders of sides, all phases of the battle must be displayed: advanced guard engagements, deployment, principal and secondary attacks, bring up the reserves into the firing line, etc. It would appear, in this regard, to be of advantage to distribute the study of the same engagement over several days by starting in the morning from the situation abandoned the previous evening up to the moment for the cessation of the manœuvre. This year, owing to the admirable weather with which the operations were favoured, it would have also been possible to curtail the long counter-marches by making one side bivouac on the ground.

The organisation of the manœuvring troops, lightened and deprived of almost all wagons, also contributed towards giving false ideas regarding the battle; units certainly gained thereby a most advantageous mobility, but it was quite contrary to reality. Calculations of time and space, too, are thereby impaired. It would appear that to this defective organisation may be attributed the origin of the tactical methods which occurred almost daily, namely, the absence of true advanced guards, and, consequently, the suppression of advanced guard actions, premature deployments, and the hasty bringing into action of the reserves.

Infantry.—Although occasionally too dense formations and but slightly concealed advances were resorted to, real progress appears to have been made in the use of concealed approaches. On several occasions one could see for oneself that famous "void of the battle-field," so often mentioned since the war in Manchuria. Progress has also been made in the flexibility with which infantry units break up; army corps, divisions, brigades extend their fronts (sometimes excessively), and on these fronts the forces are distributed very irregularly, leaving sometimes great intervals between neighbouring units. This want of precision is again found in the regiment, and even in the battalion; but the company seems to form too

compact a whole; the supports and reserves follow too close to the firing line, and would undoubtedly come within the zone of fire directed on the latter. The skirmishers carry out their rushes by entire companies at a time, never by groups smaller than the section (it is true that the companies never consisted of more than 130 men at the manœuvres); the movements, moreover, were carried out very quickly, almost always at the double, and are still executed by words of command. In accordance with the regulations of 1903, the infantry opened fire when they considered they could no longer advance without doing so. This was usually very late, at from 500 to 600 yards only from the enemy. They then advanced by alternate rushes with long firing intervals, endeavouring, at the same time, to get as close as possible to the enemy and to obtain superiority of fire. It may be that they did not acquire this superiority except at the last moment, when the rushes had brought them up to the distance for delivering the assault. They did not look for—as is constantly done in Germany, and as the Japanese did in the war in Manchuria—a "principal firing position" at 700, 800, or 900 yards from the enemy, which gives them fire superiority before coming to the assaulting distance.

Artillery.—Nothing can be said of field batteries which, only still possessing the old *matériel*, continue to make use of the procedure and methods of firing suitable to that arm. Howitzer batteries constantly played the *rôle* of field guns; they could not do otherwise, as each day's fighting was confined to a curtailed engagement, without the prolonged resistance of one of the sides necessitating the employment of curved fire in order to reach the firing line under cover behind a parapet, or the reserves massed behind an obstacle. It is unnecessary to lay stress on the inconvenience resulting to the training and organisation of artillery officers, from the composition of manœuvre batteries of 4 guns without caissons and wagons, when the field battery on a war footing actually consists of 8 guns, 8 caissons, and 5 wagons. As in 1905, the corps artillery was generally distributed in advance amongst divisions; no great fire concentrations were carried out, and, excepting the last day with the IInd Army Corps, great masses of artillery were never formed.

Cavalry.—Scouting was well carried out generally; the intelligence, almost always correct, appeared to arrive in the nick of time. The cavalry were nearly always able to act efficaciously during the fight; placed on one flank, and sometimes distributed on both, as soon as both sides were in contact, it was frequently able to delay the hostile infantry by dismounted action, by its machine gun and horse artillery fire, and even by charges on the enemy's flank.

Finally, in concluding these observations on the Imperial Manœuvres, one must do justice to the discipline, cheerfulness, endurance, and sobriety which were evinced by the soldiers of the Austrian Ist and IInd Army Corps.

Formation of an Austrian Volunteer Motor Corps.—On the 24th July last, the Emperor approved of the regulations organising an "Imperial Royal Austrian Corps of Volunteer Motorists." This new creation is not common to the Monarchy, but concerns Austria alone.

The characteristic of the new organisation is that the Motor Volunteers do not form a regular military corps; they are a civil association placed at the disposal of the War Minister, and organised in accordance with his ideas.

The object of the Corps, in the Field Army, is to co-operate in the transmission of orders and information. The Austro-Hungarian War Department, in conjunction with the National Defence Department, decides on the formation and constitution of the corps; the President of the Austrian Automobile Club is responsible for the execution of the measures necessary. The latter is the Commandant of the Volunteer Corps; he treats directly with the Austro-Hungarian War Minister with regard to all matters concerning the corps. His adjutant is appointed, on his selection, by the War Minister, in agreement with the Minister for National Defence.

The Motor Volunteers engage to serve in the Army, with their motors and motor-cycles, both in peace and in war, in accordance with the regulations laid down. The conditions necessary for becoming a member of the corps are :—

1. To be a citizen of one of the kingdoms or countries of Austria or Hungary.
2. The possession of an approved type of car (at least 16-H.P. for petrol motors), or else the possession of a motor cycle of at least 3½-H.P., and, if possible, provided with a trailer.

The Motor Volunteers, in war time, from the third day of mobilisation, are compelled to serve without restrictions, as well as their chauffeurs and servants. In peace time they must undergo, for four consecutive years, a series of exercises of a maximum of ten days each. All the members of the Corps engage to come out when called upon by the military authorities, and to obey the commanders to whom they are attached; those of them who have already been freed from all military obligations, are, however, only liable to dismissal from the corps in the event of non-observance of the preceding rules; in war time, on the contrary, all members, whatever their age, are, like all other soldiers, under martial law. The calling out and distribution of Motor Volunteers in peace time are made by the commandant of the corps, in accordance with instructions from the War Minister. Their assignment, the place and date of their calling out in war time, are communicated to them annually, in the spring, by the military authorities.

Every car belonging to a member of the corps must be accompanied by a chauffeur, who must be a native of Austria or Hungary. The same condition is exacted of every civilian servant accompanying the Motor Volunteer in time of war. As a rule, Motor Volunteers, who are officers of reserve, retain their position as officers in war time and during the drill periods in peace, and the War Minister may decide that the exercises, in which they take part as motorists, may take the place of the regulation periods of instruction.

The field uniform of the corps is as follows :—

A blue motor cap, with Imperial crown and winged wheel; a blue blouse, grey facings and collar, with Imperial crown and yellow buttons; grey riding-breeches, yellow gaiters, and yellow laced boots; grey cloak (officer's pattern); yellow waistbelt, with cartridge case, revolver in a yellow case, supported by a strap over the right shoulder; field glasses. This uniform must be worn during the drill periods; the chauffeurs have during these periods, the ordinary chauffeur's cap, and the yellow and black arm badge, with a winged wheel. A yellow and black arm badge is also given to the servants by the military authorities.

The Motor Volunteers are entitled to the following allowances:—

In peace time each day's work is paid at the rate of 15 kronen[1] per motor car, and 6 kronen per motor cycle; oil and spirit are provided gratuitously. Should the distance from the motorist's home to the place of assembly be less than 500 kilometres (about 302 miles), it is considered that the distance may be done by the car itself, and a day's journey is calculated at 250 kilometres or fraction of 250 kilometres; each day of route is paid at the rate of 15 kronen per motor car, and 6 kronen per motor cycle. Should the distance be greater than 500 kilometres, the allowance for the transport of the motorist, his car and his chauffeur is calculated at the rate of 20 kronen per motor car, and 7 kronen per motor cycle, per 100 kilometres or fraction of 100 kilometres.

In war time, reserve officers or cadets, members of the Volunteer Corps receive the pay and allowances of their rank; other volunteers rank with first-lieutenants. The volunteers with cars receive an equipment allowance of 1,000 kronen, those with motor cycles one of 200 kronen. Volunteers who are reserve officers, take their soldier-servant, to whom they are entitled, with them. Volunteer cadets, and those who are not compelled to military service, may take a civilian servant with them, who is given food, lodging, and medical care, as though he were a soldier.

Chauffeurs not compelled to military service are considered, as regards allowances, as non-commissioned officers' commanding sections in the infantry.

The Austro-Hungarian Minister of War, and the Minister for National Defence, may alter any of the preceding regulations should they consider necessary.—*Revue Militaire des Armées Etrangères.*

France.—*Proposed Abolition of Cuirassiers.*—General de Nègrier has recently expressed his opinion on the scheme for the reduction of the French Cavalry, in the following terms:—

"The thirteen Cuirassier Regiments should be abolished. They are the last remnants of the cavalry of former days. Thanks to our frequently unreasonable sentimentality, glorious legends of heroic charges have preserved them hitherto from disbandment; but one should recognise the fact, and have the courage to say so, that in these days of machine and quick-firing guns, cuirassiers are of no use whatever in the field.

"A very light cavalry is the only efficacious one. The Germans have no longer any cuirassiers. Some regiments still retain the traditional name, but they do not wear the cuirass, and are, as a matter of fact, merely dragoons. The Italians, the Austrians, the English, and the Russians have no longer any cuirassiers. The Republic alone, which is, by the way, going in for economy, keeps up the luxury of this cavalry, which is useless except for parade purposes. Cuirassier regiments are, as a matter of fact, very costly, and, further, cause a grave inconvenience by absorbing the best light-draught horses, which are now necessary for harnessing heavy field artillery, the organisation of which is both indispensable and urgent.

"Of course, if the war budget and the effective of the present contingent were elastic, it might be hoped that the thirteen cuirassier regiments might be replaced by thirteen regiments of light cavalry; but this is not the case. We haven't the means necessary, and must make a choice, and from henceforth there should be no hesitation.

---

[1] A krone = 8¾d. in British money.

"The abolition of the thirteen cuirassier regiments will provide the 9,000 horses necessary to equip the 120 heavy field artillery batteries, which must be raised without delay. A decrease in the number of Chasseur d'Afrique regiments is not to be thought of. Even now the effective of French soldiers, in proportion to the native ones, is too weak. In a Mussulman country an insurrection may always be expected, and to reduce the French cavalry in Algeria would be to place the lives of our colonists at the mercy of the Arabs.

"More than anyone I regret the necessity for diminishing the cavalry, but it must be anticipated that even after the abolition of the cuirassiers, one will be led, as a consequence, to further reduce the number of regiments. The decrease in the cavalry effective as firearms improve must always be the rule. Cavalry can only delay its application by finally recognising the fact that its essential *rôle* in battle has become dismounted action, the horse being only the means for carrying rapidly to the point necessary the rifles, machine guns, and the guns which can alone decide the fate of an action."—*La France Militaire.*

ITALY.—*Italian Conscription.*—The following account of the recruiting of the 1884[1] Class, instructive from more than one point of view, is taken from *Il Diritto Militaire Italiano* :—

"Of the 475,957 youths inscribed on the recruiting lists at the opening of the session (April, 1904), 357,134 were admitted to the drawing of lots. The difference between these two figures is made up as follows: 108,835 officially entered at the head of the list and omitted from prior classes; 9,426 entered for the Navy; 290 improperly entered; and 272 entered twice. During the operations, 3,891 men, coming from the preceding classes, who had failed to appear, were added to the various lists in such a manner that (deduction being made for those wrongly entered or entered in duplicate, and of those entered for the Navy) the number of youths available for conscription reached the total of 469,860, of whom 365,068 were born in 1884. The number of young men born that year exceeds by 17,528 those born in 1883.

"But the number 469,860 is still not the final one resulting from the drawing of lots; 13,130 of those on the lists were further struck off, which thus reduces the total effective to 456,730 men. The following is the distribution of that number :—

Cast as unfit for service	...109,070
Put back to the following year	107,173
Failing to appear	39,219
Enrolled in 1st Category	97,131
Enrolled in 2nd ,, ...	1
Enrolled in 3rd ,, ...	94,136
Grand Total	456,730

"Thus out of 456,730 men on the recruiting registers, only 191,268 were actually enrolled. There is but little comfort to be drawn from these figures! About half the men on the registers (226,243) were either quite unfit for service or put back for some constitutional weakness. A third of the remainder escape military service either by exemption or failing to appear, so that there remains barely two-fifths of those borne on the

[1] In Italy the classes are named from the year of the birth of the recruits.

recruiting registers available for conscription. The number of those failing to appear should be noted. To emigration must be attributed the continually increasing number of men failing to appear who are borne on the registers, and the parts of the country supplying the largest number of emigrants are also those from which the greatest number of those men come.

"Of the 97,131 on the registers, who were actually enrolled in the 1st Category, 17,766 belong to men put back from previous classes, and 4,363 were already serving with the colours as volunteers; 11,187 men further disappeared from this total, and the number of those drafted into different corps amounted to 81,581. If to that number is added the 4,363 volunteers, we have a total of 85,944 men to take part in the national defence. It is sufficient to compare that number with the one finally registered on the census lists (456,730) to draw the conclusion that the permanent Army has hardly benefited by 188 men per 1,000 recruits. This percentage, too, is still further diminished by 1,306 men enrolled in the customs, by 1,456 men who obtained a postponement for joining, and by 1,473 men dispensed from service in peace by the Emigration Law.

"The 81,581 men drafted into corps were thus distributed:—

	Men.
Infantry	54,907
Cavalry	6,949
Artillery	11,349
Engineers	2,984
Transport	1,577
Royal Carabiniers	1,310
Medical Service	1,027
Commissariat	801
Complementary Cadet Officers...	360
Cadet Sergeants	317
Total	81,581

"Of the 4,363 youths belonging to the 1884 Class who were already in the Service at the time of the conscription operations, 53 were officers, 178 pupils in recruiting establishments, 241 were one-year volunteers, and 3,981 were ordinary volunteers.

"For the period 1875-1884 a table (below) has been drawn up showing the numbers on the registers and those actually enrolled in the 1st Category:—

Class.	Registered.	Enrolled.	Percentage.
1875...	404,352	89,172	22·5
1876...	443,393	92,293	20·8
1877...	420,389	94,215	22·4
1878...	406,157	97,399	23·9
1879...	412,133	96,956	23·5
1880...	387,444	86,353	22·3
1881...	439,391	94,082	21·1
1882...	471,171	92,952	19·9
1883...	453,640	96,916	21·3
1884...	469,860	94,130	20·1

"Thus the numbers increase on the recruiting registers, but those of the recruits enrolled diminish because the number of the unfit goes up continually. This fact should attract the special attention of the Government and also of hygienists. Although the fact is of sufficiently grave import, one should not draw from it general conclusions as to the physical degeneration of the race.

"The primary cause of such a state of affairs is due to emigration, which annually expatriates the best part of the masculine population from 25 to 40 years of age. As this exodus has been going on on a vast scale for the last 30 years, the result remains that those on the registers who present themselves annually for conscription are the products of generations deprived of their strongest elements, or else the sons of too old parents. Another reason for the increase in the number of the unfit is due to the strict severity of the medical examination. As regards emigration, it may be added, from a military point of view, that it affects not merely recruits, but also—and chiefly—soldiers on leave, thousands of whom emigrate every year. Should a war break out, it cannot be denied that there would not be the number of men necessary to complete the cadres and to form the reserves. Frequently the average of emigrants has annually exceeded half a million, and it is not necessary to state that the emigrants are especially men in their full vigour. As long as this goes on we can only expect a population of old men, women, and children."

New Field Gun.—L'Illustrazione Militaire Italiano gives a detailed table of the dimensions, weights and ballistic *data* of the new 76-mm. field gun made of Siemens-Martin steel and mounted on long recoil carriage, from which the following is taken :—

Calibre	2·99 ins.
Diameter of wheels	51 „
Maximum length of recoil	46 „
Limits of Fire { Horizontally	8°
Limits of Fire { Vertically	22°
Rounds per Minute	20
Weight of Gun	590 lbs.
Weight of Gun in Battery	2,136 „
Weight of Limber (with 32 projectiles)	1,736 „
Weight of Gun and Limber, without Gunners	3,642 „
Weight of Caisson „ „	3,042 „
Weight of Projectile	14·3 „
Number of Shrapnel bullets, 11 grs. each	280
Weight of Charge (Cordite)	1·034 lbs.
Muzzle velocity	1,978 f.s.
Remaining velocity at 5·700 m.	650 f.s.
50 per cent. rectangle at 5·700 m. { width	2·40 m.
50 per cent. rectangle at 5·700 m. { depth	20 m.
Range at 20° elevation	6,000 m.

—*Journal of United States Artillery* and *Revue du Cercle Militaire.*

RUSSIA.—*Tactical Instructions to the Troops by the Governor-General of Varsovie.*—General Sakalon, the Governor-General of Varsovie, has recently issued some interesting instructions for the purpose of indicating the methods by which the tactical training of the troops should

be carried out. It merits reproduction because it summarises the impressions left on the Russian Army by the Russo-Japanese war :—

The improvement of the means of destruction, and especially the adoption of the small-bore rifle, of Q.F. artillery, and of various technical improvements, have introduced considerable changes into the methods of the conduct of a battle. The power of the modern rifle and of artillery fire is such that the uninterrupted forward movement of dense formations lays the troops open to great losses, and sometimes to the risk of complete destruction. The recent war has made conspicuous certain changes in the conditions of the conduct of war, and our Army was obliged, even during the war itself, to alter its habitual fighting formation. It is consequently proper to introduce modifications into the training and education of the men.

Infantry.—As in the past, the infantry plays the chief part in war, and the same means have remained at its disposal, viz., fire and the bayonet. Although the skilful employment of fire power has sometimes caused the evacuation of positions, the bayonet, which is now more rarely used, remains, nevertheless, the decisive means of breaking down the final resistance of a vigorous adversary. Great efficacy of fire demands a skilful use of ground and the employment of fortification, not only in the defence, but also in the offensive. Entrenchments should be as little visible as possible, and should blend with the surrounding terrain. In action, in flat country, in order to avoid losses, it is not merely of importance to protect the troops from the bullets and shells which fall amongst them, but also to keep them out of the enemy's sight. Great attention should therefore be paid to masking both the trenches and emplacements of troops in action. It is, therefore, indispensable to resort as frequently as possible to night operations in spite of the difficulty of their execution.

The conduct of action on a wide front and also one of great depth only permits of the company being directed by means of orders, and not by the commanding officer alone, and demands a great initiative from subordinates, and even from isolated skirmishers, as well as a careful organisation of connections. The possibility of too rapidly issuing all the reserve ammunition and the difficulty of superintending the fire of isolated men gives a special importance to the conduct of fire. The necessity for supervising the consumption and the supply of ammunition, and of reporting it opportunely to the company commander, lies with the section and subsection commanders. There are three kinds of fire, viz., individual, slow at will or magazine, and volleys. Individual fire should be used at medium and short ranges, from 1,800 to 1,400 yards. Volley firing may be used at 3,000 yards on large objectives, and it may be useful to resort to indirect fire on invisible objects. It is understood that as regards long-range fire, it should be employed with great discretion, as the results may be insignificant and combined with an enormous consumption of ammunition. At night, the fire should preferentially be carried out by volleys, which is the best means of keeping men in hand who are becoming demoralised. Generally, as regards control of fire discipline, it is sometimes useful to completely cease fire, and to take to volley firing. Two or three observers per section should be selected to note the results of the fire, and to watch for the appearance of new objectives.

The assailant should remember that the advantage of the defensive lies in the possibility of making use of the whole of his fire power. Consequently the offensive should be preceded by the most careful recon-

naissance of the hostile position and of the terrain in front and on the flanks of the position. Isolated companies, scouting detachments, or scouting officers with some volunteers, should go to the front and endeavour to determine the front, the flanks, and the approaches of the hostile position. In addition, the first period of the action should be a sort of reconnaissance, and large units should not be brought into action until the results of the reconnaissance have been verified and a definite decision arrived at. This decision should be communicated to all commanders. The company commander must inform himself of the mission received and give the necessary indications to all section commanders and to those of smaller units, because these sections sometimes receive independent missions.

The range of artillery fire is 6 versts (about 6,900 yards). On arriving at this range, troops under fire open out by companies, and at a distance of 5 versts (about 5,800 yards) break up by sections without keeping to regular intervals, and cover themselves by a strong chain of patrols. At a range of 4 versts (about 4,700 yards) from the hostile artillery all the fractions of the fighting line take open formation by opening out between files and by echeloning the ranks in depth to a distance exceeding 50 paces. The assailant from the distance of 5 or 6 versts should take all precautions for approaching the enemy concealed from his view. Although at these ranges the losses cannot be great, still the enemy by following the direction of the movements of large bodies of troops can profit by them to concentrate on the latter a powerful fire when they arrive closer. Consequently from those distances it is perhaps better for the assailant to move his men in small groups, who would disappear in folds of the ground. From 3,000 paces skirmishers are deployed and fire opened. At that distance only surfaces can be fired at, but from 2,500 paces the fire on columns gives good results. The extent of the front of a company depends on its mission and on the ground, but as a rule it may be greater than the normal front laid down by our regulations (200 paces). In the defensive, only points most capable of defence are occupied; in the offensive, favourable approaches, dead angles, etc., are selected. Sections and even smaller units may be detached to carry out an offensive fire action on the enemy's flank. To diminish losses the distance of the nearest reserves from the chain of skirmishers may be extended to 800 paces.

The advance is made man by man or by small groups, the fractions reforming groups on successive fire positions, behind cover, or in dead angles, and fortifying the terrain gained. Section commanders themselves select the positions and cause them to be reconnoitred by two or three men sent forward with that object. From 1,800 to 1,400 paces, individual fire is carried out with rapidity varying with the importance of the objectives. From 600 to 500 paces its intensity is brought up to its maximum. It must be understood that the preceding rules apply to open country. The utilisation of the ground and its nature may modify them. As a general rule the conditions of modern fighting in the offensive require a liberal recourse to the employment of the most variable formations and methods, taking into account both the ground and the enemy's fire.

Owing to the increase of fire power and the employment of fortification, attacks now entail great loss, whilst the defender, masked in his trenches or behind objects on the ground, as a rule suffers less from frontal fire than the assailant. Consequently every offensive action should include an enveloping movement on one or on both of the defender's flanks, and in this case fire alone coming from that direction may give decisive

results. These enveloping movements may be carried out by the reserves or by portions of the chain of skirmishers constantly bearing towards the outer flank; or still better by the re-groupment, concealed from view of the enemy's flank, of the forces meant to carry out the enveloping movement, and to come unexpectedly into action.

The most difficult part of the offensive commences at 500 paces. Movement in the open entails enormous losses. The chain of skirmishers should advance by degrees, re-grouping and entrenching behind all existing cover, making some, should none exist, by means of all available material, such as stones, beams, sand-bags, etc. Should the distance from the enemy's position be still too great to attempt to carry it by the bayonet, the assailant will be compelled to approach the defender's position to 20, 10, or 5 paces, otherwise he will have to pay dearly for every useless pace taken in the open. The spade is here of great service, and it is, in consequence, indispensable to an infantry soldier.

The necessity for resorting to such methods slackens the attack, which may last for days. In order to accelerate it and diminish the losses, recourse must be had to night operations, either by approaching the hostile positions during the night, so as to be able to resume the action at daybreak at as small a distance as possible, or by approaching during the night to within 600 or 400 paces, and by massing overwhelming forces against certain sectors of the position and hurling them on the latter under cover of the darkness.

The advance should always be combined with a terrific fire. In certain portions of the hostile position the nature of the ground in front of it does not permit of approach. At the moment of attack these sectors should be heavily bombarded. With this object a thin line of skirmishers well supplied with cartridges may be left facing them, and the remainder bear to the right or left in the sectors of other units to reinforce the attack. Thus the last phase of offensive action and of the attack depends entirely on the skill and quality of the troops, and cannot be cut and dried. The bayonet shock, if the enemy hasn't first retired, is oftenest carried out simultaneously along the whole front of the attack, as was formerly possible. After ousting the enemy, the advance should be continued up to the first advantageous firing position to carry on from there the pursuit by fire. The position occupied is rapidly placed in a state of defence. The machine guns can then render the greatest service. As the hostile artillery in position from 1 to 2 versts from the trenches will hasten to open a crushing fire on the lost position, it should be borne in mind that there is no suitable position for dense formations or for chains of skirmishers in the open.

Artillery.—Artillery represents the greatest power of fire. The latest improvements, especially the possibility of directing the firing by means of the goniometer, have considerably changed the methods for the employment of artillery. Above all, to diminish the loss by fire, positions masked by some objects (trees, bushes, etc.), or the occupation of a reverse slope from the enemy should be admitted as normal for artillery. In artillery action it now frequently happens that fire has to be directed on invisible objects (batteries, masked trenches, hidden reserves) or on objectives which only appear for a very short time, getting over the open spaces of ground as quickly as possible and making every use of cover (advancing infantry and cavalry).

Masked positions and invisibility of objectives necessitate the organisation of the conduct of fire. The battery commander or the observer is placed at a point where the targets to be fired at are visible. The trans-

mission of orders and of observations are made by telephone, flag signals, or other means. The success of artillery fire depends on the precision and exactitude with which its duties have been assigned it, on the method with which the fulfilment of these duties has been distributed amongst the batteries, and the batteries themselves distributed on the positions; and finally, on the intelligence with which the batteries rapidly transfer their fire and concentrate it on no matter what objective. These conditions demand the concentration of the direction of fire in the hands of a single individual, who should be in connection, at the same time, with the batteries and with the commander of the troops. The massed action of artillery, so indispensable for obtaining decisive results in a short time, is obtained not by the piling of batteries together, which only helps the enemy in his fight against our artillery, but by the possibility, on the order of the artillery commander, of transferring and concentrating the fire of all the batteries, even though separated, on a position or on a sector.

The mission received by the artillery from the chief command, in addition to the indication of the general objective to be attained and of information on the situation, should include indications of the first objects, to the attainment of which the artillery should combine. The distribution of the artillery on the position may be left in the hands of the artillery commander, but in that case it should be pointed out to him in what zone the battery emplacement may be selected. The invisibility of most of the objectives necessitates a particularly careful reconnaissance of the emplacement and forces of the enemy, and of a constant observation directed on them, quite independent of information received from the commander of the troops and from the neighbouring troops. With this object, artillery scouts should proceed far in advance (in the offensive in advance of the advanced guard, in the defensive in advance of the advanced positions), conform skilfully to the ground, observe both the front and the flanks, note objectives requiring artillery fire, and organise the transmission to the rear of the observations made and the information obtained.

Firing over one's own troops has become quite usual. There is no danger to the troops, who are at least 600 paces in advance of the guns, or at least 500 paces from the objects being fired at. In other words, artillery fire on the point of attack should continue till the assaulting troops are almost on the point of charging.

Battery positions should be carefully prepared, as regards fire, from all points of view. Trenches should be dug to shelter the gunners; the best type of trench for the guns is the sunken trench without parapet. It is of advantage to prepare several emplacements for the battery, so that it may be able to change them without being observed, if the enemy has got the range. Battery positions in the open will be the exception, as well as changes of position during the action. But in order to support the attack, to keep up the spirits of the advancing troops up to the bayonet attack, artillery should not shrink from taking up positions in the open, even if it is only with a few guns. When guns fire from a covered position there must always be dead angles. If it is impossible to obviate them through the action of neighbouring batteries, machine guns may be advantageously used for that purpose.

The assailant should not hesitate to throw forward the batteries of the advanced guard to support the fighting of the reconnoitring troops. The defender, utilising his advantages (marking of the distances and the greater visibility of the assailant), opens fire with a few batteries on the first possibility of inflicting serious loss on the assailant. As other objec-

tives, such as infantry and artillery, reveal themselves, fire is directed on them, but a portion of the batteries continue to engage the hostile artillery. In a general way one must hold oneself ready to silence the hostile batteries by a crushing fire if they try to enter into action.

The chief mission of artillery in the fight remains the same as it was before, viz., to come to the assistance of its infantry, remove everything that may interfere with its advance, oppose the offensive of the hostile infantry and everything that may assist its movements. Artillery action consists of a series of violent engagements with the enemy's batteries, and of intervals of firing with the greatest rapidity on other objectives, with lulls and even cessation of fire when it is not possible to fire with any probability of doing harm to the enemy. The holding artillery in reserve is contrary to the necessity of utilising all the power of its fire.

The *rôle* of the reserve may be played by batteries placed in masked positions ready to open fire on the instant. In large units where the reserve consists of 3 or 4 regiments, a portion of the artillery may also be left in reserve, kept under cover from the enemy's view and preferably close to its probable positions, which will have been carefully prepared with a view to the opening of fire.

Cavalry.—The success of the attack is ensured by the opportune selection of the moment, by the direction in which it is carried out, by rapidity of movement, adaption to the ground, appropriate formations, and the suddenness of the attack. Should the favourable moment not be grasped, cavalry exposes itself to heavy loss. Dismounted action has acquired a special value, and frequently affords advantageous occasions for attack. The employment of machine guns is most useful. Reconnaissance has become far more complicated; it requires a thorough training and skilful execution. Its results greatly depend upon its method of organisation. Cavalry should, without losing view of the hostile cavalry, act chiefly against the enemy's infantry and artillery. Actions on the flank and rear of the enemy offer a vast field to cavalry enterprise.

Connections.—The huge area covered by battles in the present day has rendered its direction infinitely more difficult, especially in broken ground. The Commander-in-Chief is not in a position to see everything himself, and must therefore have special means available for obtaining information. In consequence of the great distances, which exclude the possibility of a continuous distribution of orders, great liberty of action must be given to executive organs. The chief, however, requires to be as well informed as possible on what is taking place. The establishment and regular upkeep of connections have acquired the more importance than was formerly considered necessary. Small tactical units should themselves ensure connections along the front and depth even when the neighbouring troops belong to other branches of the Service. Small patrols are appropriate to this object, and can carry out reconnaissances of short distances. The troops, in addition to the periodical reports, should send information on special events, not only to their superiors, but also to neighbouring groups. In action, connections must be rigidly maintained. For that object all available means should be employed and despatch of orderlies organised in relays: signalling with flags; optical signals; telephone; telegraph and balloons. As regards the employment of technical methods, special troops should be used as far as possible.—*Ruskī Invalid* and *La France Militaire.*

Spain.—*Scheme of Army Re-organisation.*—The War Minister, General Luque, has recently laid a long scheme of military reforms before the Cortes; the following extract concerns the most important :—

The Peninsular will be divided, from a military point of view, into eight districts, each military district being commanded by a lieutenant-general, who will be captain-general of the district. The troops of the Regular Army will be so re-organised that there will be a complete separation between units forming the garrisons of fortified places, and those which should constitute field armies.

As the importance and requirements of a campaign cannot be laid down definitely beforehand, units superior to a division will not be organised; it will suffice to suitably group the number of divisions necessary to form an army capable of opposing the adversary. The peace organisation of these divisions will be exactly similar to those they must have in war. In the latter case it will be merely necessary to increase the number of combatants and non-combatants by enrolling in sufficient time those men who are on unlimited furlough.

Each division will consist of two infantry brigades, a chasseur battalion, a cavalry regiment, and an artillery regiment, plus engineers, and administrative medical and transport services. The infantry brigade will consist of two Regular regiments of three battalions each.

The average effective of the division will be 6,000 men, and may be increased to 8,000 or 10,000 at training and manœuvre periods. The increased expenditure resulting will be balanced by sending on leave a suitable number of men for the rest of the year. In the event of war the effective of the division will be raised to 16,700 men.

Independently of the above-mentioned divisions, there will be a cavalry division with horse artillery, detached cavalry brigades, siege and mountain artillery units, as well as units of pioneers, railway troops, and balloonists, who will be attached to divisions with which their services are required. The camp at Gibraltar, which is a special case, will be occupied by a mixed brigade, including the three arms as well as the necessary troops and services, to enable it to act in case of war.

The positions in Africa, the Balearic Islands and the Canaries, will have an organisation similar to the present one (see JOURNAL for January, 1905, page 95), but based on the principles guiding the organisation of the Peninsular.

Parallel to each division a reserve brigade, of all men of the first reserve will be formed. In order to ensure the recruiting and general mobilisation requirements, a zone, for each of the civil provinces forming it, will be organised in the Peninsular. These zones will form centres, in which there will be as many recruiting officers as the density of the population may require. The same number of battalions of the second reserve and depôts corresponding to cavalry, artillery, and engineers, will be formed there.

With the patriotic object of making use of all elements available to the nation by employing them according to their capabilities, without increase of cost, a Territorial Army will be organised, which will be commanded and officered by retired and reserve officers.—*Revue du Cercle Militaire.*

New Recruiting Regulations.—The *Correspondencia Militar* gives the following information with regard to the new scheme of recruiting regulations :—

The basis of the scheme is obligatory military training. Under the present scheme 69 per cent. of the men passed fit for service go through the period fixed by regulation without passing through the ranks. To

remedy this evil, the War Minister demands in his scheme that all men passed fit must receive military training, so that in the event of war they may be of use to their country.

The period to be passed in the active reserve should be increased by a year, and consequently the total period of military service will be 15 years, viz., 2 years in the Regular Army; 4 years in the first reserve; 7 years in the second reserve; and 2 years in the Territorial Army.

There will no longer be any conditions as regards height. These two measures will increase by 11 per cent. the number of the annual contingent.

Men who buy themselves off by the payment of a certain sum of money must receive military instruction, and will be called out for that object. At the same time, these men, who will be merely exempted from garrison duty, will be excused from duty in barracks, and will maintain themselves at their own expense.

Men passed fit for service may obtain temporary exemption from military training on account of their studies or personal interests. These men, as well as those altogether exempted, will pay a tax. Such are the general lines of the new scheme of the recruiting regulations.

CORRESPONDENCE.

THE TRAINING OF MILITIA ARTILLERY.

To the Editor of the JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION.

SIR,—I should like to draw attention to a point of some practical importance in connection with Colonel Legard's lecture on the training of Militia Artillery, namely, his proposal to increase the number of 'specialists" in the Regular companies to which he wishes the Militia units to be affiliated.

I have, unfortunately, no experience of home service, but I think it can hardly be disputed that the companies at home labour under difficulties unthought of in those abroad. Even in the latter, however, I think any increase in the *qualified* specialists would be difficult to obtain — it is by no means easy to maintain the existing establishment. The many difficulties in the way of training layers and the tedious but obligatory duties connected with it, can only be appreciated by those who have had to carry out this important work in recent years. I do not think I am exaggerating when I say that to maintain twice the present number of trained specialists on a lower total strength in the companies at home is, under the present conditions, impossible.

If the specialists are to be provided by the Regulars, the strength of the latter must be increased. You cannot make a man into a reliable trained layer by calling him one, or even by paying him as such. If this is too expensive, the Militia must find them; but the only chance of their being any use appears to be offered by the proposal to call them up for a preliminary training, which could be carried out under the supervision of the O.C. affiliated company or of the gunnery instructor. It would be desirable that the senior non-commissioned officers should also come out, as one cannot carry on when instructors and pupils are both

untrained. If a preliminary training of 14 days for specialists could be sanctioned for trial in one or two corps, some solid grounds on which to base an opinion would be obtained. Without such a trial, no opinion as to the value of Militia specialists or of the services of a Militia Garrison Artillery can carry much weight. The value of Militia Garrison Artillery depends upon the efficiency of the officers, non-commissioned officers, and specialists; the non-specialist duties can be learnt by anyone in a week.

It is generally considered, and laid down in Regulations, that specialists require constant and regular practice to keep them efficient. Whatever opinion may be held as to the precise details given in "Instructions for Practice Seawards," no one who has seen the work of Garrison Artillery specialists can deny the need for continuity and regularity. There are so many details of manipulation of instruments, knowledge of electrical gear, besides changes of procedure and of patterns of gear, involved in the duties of specialists, that it is hardly likely a man can keep up to date with one month's training a year, if taken all at once. Instruction given in smaller doses, but more frequently, would, I think, produce better results, even though the total amount were somewhat less. If I may be permitted to offer my personal opinion, I should prefer the specialist who, after qualifying, had done one to two hours a fortnight to the one who had been up for 28 days' training. The former would never be badly out of form, whereas the latter would very likely be useless at the beginning of his training, and possibly stale at the end of it.

For the above reasons it appears to me, as an outsider, that training on Militia lines is not so suitable for Garrison Artillery, as that on Volunteer lines. For reasons of rapid mobilisation and easy quartering also the local Volunteer system appears to be preferable to a Militia system for coast defence troops of all kinds.

I have the honour to be, Sir,

Your obedient servant,

M. H. C. BIRD,
Capt. R.G.A.

NAVAL AND MILITARY CALENDAR.

NOVEMBER, 1906.

3rd	(Sat.)	3rd Bn. Lancashire Fusiliers arrived in Ireland from South Africa in the "Avondale Castle" for disbandment.
5th	(M.)	H.M.S "Magnificent" paid off at Devonport.
„	„	H.M.S. "Diana" paid off at Devonport.
6th	(T.)	H.M.S. "Africa" commissioned at Chatham for Atlantic Fleet.
„	„	H.M.S. "Diana" recommissioned at Devonport for service in Mediterranean.
„	„	H.M.S. "Highflyer" commissioned at Devonport for East Indies.
9th	(F.)	1st Bn. Leicestershire Regiment arrived in England from India in the "Dongola."
10th	(Sat.)	Launch of first-class protected cruiser "Pallada" from New Admiralty Yard, St. Petersburg.

10th (Sat.) XIth and XIIIth Brigades R.F.A. arrived in India from South Africa in R.I.M.S. "Dufferin."
" " A Boer, named Ferreira, with several followers, crossed the Orange River from German West Africa, surprised police camps at Abiam and Witkop, wounded and killed police and seized ammunition.
12th (M.) T.M. the King and Queen of Norway and H.R.H. Crown Prince Olaf arrived in England on a visit.
13th (T.) H.M. the King of Norway was invested with the Order of the Garter at Windsor Castle.
14th (W.) H.M.S. "Prince of Wales" left Spithead for Mediterranean.
" " H.M.S. "Diana" left Devonport for Mediterranean.
15th (Th.) 53rd Co. R.E. arrived in England from St. Helena in the "Cluny Castle" for disbandment.
" " Three of Ferreira's band, including his brother, were captured by the Cape forces.
" " Launch of Japanese first-class battle-ship "Satsuma" from Imperia Dockyard, Yokosuka.
16th (F.) H.M. The King was appointed an honorary Colonel in the Norwegian Army.
17th (Sat.) Launch of first-class armoured cruiser "Rurik" from Vickers' Yard, Barrow-on-Furness, for Russian Navy.
" " 46th Co. R.E. arrived in England from South Africa, in the "Braemar Castle" for disbandment.
" " 1st Bn. Dorsetshire Regiment left England for India in the "Rewa."
" " Ferreira and all his followers were captured by the Cape Mounted Rifles.
18th (S.) H.M.S. "Irresistible" arrived at Sheerness from the Mediterranean.
19th (M.) 3rd Bn. Manchester Regiment arrived in England from South Africa in the "Braemar Castle" for disbandment.
21st (W.) H.M.S. "Bacchante" left Portsmouth for Gibraltar and Mediterranean.
" " 1st Bn. King's Own Scottish Borderers left England for Egypt in the "Dongola."
26th (M.) H.M.S. "Irresistible" paid off at Chatham.
" " Destruction by fire of French Torpedo-Schoolship in Toulon Harbour, with loss of 3 lives.
27th (T.) H.M.S. "Irresistible" recommissioned at Chatham for Mediterranean.
28th (W.) 2nd Bn. Royal West Kent Regiment left Hong Kong for Singapore in the "Soudan."
29th (Th.) H.M.S. "Irresistible" left Chatham for Mediterranean.
30th (F.) H.M.S. "Leviathan" arrived at Portsmouth from Mediterranean.

Addendum to October Calendar.

20th Oct. (Sat.) Launch of first-class battle-ship "Andrei Pervozvanni" from Galernii Island Yard, St. Petersburg, for Russian Navy.

FOREIGN PERIODICALS.

NAVAL.

ARGENTINE REPUBLIC.—*Boletín del Centro Naval.* Buenos Aires: September, 1906.—"Strengthening the Squadron and Defence of the Rio de la Plata." "Formulas of Penetration." "The Russo-Japanese War, 1904-05: Sanitary Services" (*continued*). "New Method for Refloating Sunken Ships." "On Some Interesting and Useful Applications of the

Calculation of the Law of Probabilities" (*concluded*). "Terra del Fuego." "Extension of the Port of the Capital." "The Grand French Submarine and Torpedo Manœuvres." "The Hydrography of the River Descado." "Naval Notes."

AUSTRIA-HUNGARY.—*Mittheilungen aus dem Gebiete des Seewesens.* No. 12. Pola: December, 1906.—"The Tactical Exercises of the French Fleet in the Mediterranean." "The Salvage Works on the "Montagu."" "The French Building Programmes for 1907: New Distribution of the Fleet." "On the New Harbour at Varna." "Foreign Naval Notes."

BRAZIL.—*Revista Maritima Brazileira.* Rio de Janeiro: August, 1906.—"E. Root." "Military Operations and Naval Supremacy." "Naval Auxiliaries and Navigation in General." "Military Jury." "The Measurement of Ships." "Report of the "Innsbruck Commission."" "The Navy in Parliament." "Voyages on the Navigable Rivers of the Province of Espirito Santo" (*continued*).

CHILI.—*Revista de Marina Valparaiso.*—Has not been received.

FRANCE.—*Revue Maritime.* Paris: September, 1906.—"The Maritime Interests of Germany." "The Navy at the Capture of Algiers" (*continued*). "Study in Naval Strategy" (*continued*). "Development of Turbines for Steam-ships."

October, 1906.—"*Resumé* of Reports Collected on Board the Russian Cruiser "Gromoboi."" "The Navy at the Capture of Algiers" (*concluded*). "The Lubrication of Engines." "Study on Naval Strategy" (*concluded*).

La Marine Française. Paris: September-October, 1906.—"The "Lutin" Catastrophe and the Naval Programme." "The Delay in the Construction of Submarines—Neglect of the Financial Law—The Volte-face in the Department of Marine—Appropriation to the Battleships of 20 Millions Voted by Parliament for Submarines and Destroyers—No Submarines, or an Increase of 40 Millions if the Six Battle-ships are Maintained." "The Battle-ship of the Future. It must have a Displacement of 25,000 Tons, Steam 22 Knots, and Cost 65 Millions." "Naval Artillery: Construction and Working." "The Berlin International Conference on Wireless Telegraphy."

Le Yacht. Paris: 3rd November, 1906.—"Admiral Fournier's Report on the Naval Manœuvres of 1906." "Yachting Notes." "A Problem of Oceanography." 10th November.—"The Distribution of the English Naval Forces." "Yachting Notes." "The New English Destroyer "Gadfly."" "The Congress of Maritime Syndicates." 17th November.—"Steam Turbines on Board Ships." "Yachting Notes." "A Last Word *à propos* of the "Lutin."" "The Milan Universal Exhibition." "A Problem of Oceanography" (*concluded*). "The [illegible]-Wages of the "Inscrits."" 24th November.—"Steam Turbines on Board Ships" (*continued*). "Yachting Notes." "The Military Port of Tarentum." "The New Armoured Cruiser "Victor Hugo."" "The Naval Programme in Parliament."

Le Moniteur de la Flotte. Paris: 3rd November, 1906.—"The New Distribution of the British Fleet." "Admiral Fournier's Report on the Naval Manœuvres of 1906." "The Budget of 1907 and New Construc-

tion." "The Navy in Parliament." "The Sunken Submarine." 10th November.—"The Volume of Fire." "The Loss of the "Lutin."" 17th November.—"The Influence of Deep Water on Speed." "The Promotion of Officers." "The Navy in Parliament." "Admiral Fournier's Report on the Naval Manœuvres of 1906" (*continued*). "The Loss of the "Lutin."" 24th November.—"The Guns of the "Danton" Class." "Admiral Fournier's Report on the Naval Manœuvres" (*continued*). "The Loss of the "Lutin.""

GERMANY.—*Marine Rundschau.* Berlin: November, 1906.—"The Pan-American Policy." "An American Study on "The Elements of Fleet Tactics."" "The Historical Development of the Japanese Navy." "The Surrender of the "Bjädowy" and Nebogatoff's Ships before the Court-Martial." "The Introductory Note to the French Naval Estimates for 1907, and the Debate by the Budget Commission." "The Trials of the "Dreadnought."" "Exchange of Opinions on the Essays:—Some Remarks on the Proposals on the Training-ship Question."

ITALY.—*Revista Marittima.* Rome: October, 1906.—"The International Congress for the Study of the Polar Regions." "The Moral Education of the Sailor." "Centrifugal Pumps for the Movement of Large Volumes of Water on War-ships." "The Public Works on the Wangpoo River." "The State and the Mercantile Marine in France."

PORTUGAL.—*Revista Portugueza, Colonial e Maritima.* Lisbon: October, 1906.—"The Island of St. Thomas" (*concluded*). "Genealogical and Bibliographical Data of Some Fayal Families" (*continued*). "The Loss of Mombasa in 1631." "On the Study of Geography."

Annaes de Club Militar Naval. Lisbon: September, 1906.—"The Sextant and Observations of Precision for Unknown Altitudes." "Trials of Launching Torpedoes in 1906, in the Bay of Cezimbra." "Home and Foreign Notes."

SPAIN.—*Revista General de Marina.* Madrid: October, 1906.—"The Battle of Trafalgar" (*continued*). "Our Naval Base" (*continued*). "Lessons" (*continued*). "The Sponge" (*concluded*). "The Manœuvres of the French Fleet." "On the Electrical Working of Cargo Dischargers." "The English Naval Manœuvres in 1906." "Naval Artillery." "The Presumed Cost of the Navy." "The Polar Congress at Brussels." "Launch of the Cruiser "Reina Regente.""

MILITARY.

ARGENTINE REPUBLIC.—*Revista Militar.* Buenos Aires: September, 1906.—"Special Mountain Troops in Italy." "Principles of the Organisation of the Field Army on a War Footing." "Use of Explosives in War."

AUSTRIA-HUNGARY.—*Danzer's Armee-Zeitung.* Vienna: 1st November, 1906.—"Change of Ministers." "What Lessons should our Navy draw from the last Naval War?" (*continued*). "Proposals for Raising the Pro-

fessional Zeal of Officers" (*concluded*). 8th November.—"The Infantry Division in Peace." "The Tutelage of Officers." "What Lessons should our Navy draw from the last Naval War?" (*concluded*). 15th November.—"A War Romance." "On the New Edition of the Dress Regulations." "Judging Distance, Measuring Distance, or Observation?" "An English Criticism of the German Imperial Manœuvres." 22nd November.—"My Programme." "Training and Education of the Non-commissioned Officer." "Marriages in the Austrian-Hungarian Army." "Transport of the American Expeditionary Corps to Cuba." "The French Heavy Artillery of the Field Army." 29th November.—"Field-Marshal Count Beck and the General Staff." "Field or Voluntary Railways for War." "On the Development of Cyclists and Motor Cyclists in the Army."

Mittheilungen über Gegenstände des Artillerie- und Genie-Wesens. Vienna: November, 1906.—"Fixing the Angle of a Sloping Backsight from the Results of Musketry Experiments, and the Ascertaining of a Formula of General Validity for it." "Influence of the Ground on the Judging of Great Deviations when Shooting."

Die Neue Militarische Welt. Vienna: November, 1906.—"The Austrian Troops in the Campaign in Schleswig-Holstein, 1864." "Free Railway Traffic." "Red Cross in Germany." "Kolberg's Importance for Schill." "A Napoleonic Maxim." "Military Ballooning Questions." "Deficiencies in the Organisation of the German Military Forces." "Disarmament of Italian Field Artillery."

Streuffleurs Oesterreichische Militarische Zeitschrift. Vienna: November, 1906.—"Thoughts on Arcola." "A New Method of Indirect Shooting." "Stability of Motors for War Purposes." "On the Promotion of Officers." "The Swiss Infantry Provisional Musketry Regulations." "Influence of Modern Firearms on Infantry Fortified Positions." "Information from Foreign Armies."

Organ der Militär-wissenschaftlichen Vereine. Vienna. Vol. LXXIII. Part 5, 1906.—Has not been received.

Kavalleristische Monatshefte. Vienna: November, 1906.—"Battle Training of Cavalry" (*continued*). "Clothing, Equipment, and Armament of Cavalry." "The Efficiency of the 7th Cavalry Division at the Silesian Manœuvres." "Our Cavalry at the Manœuvres." "Schweinschädet and Königgrätz" (*continued*). "Foreign Cavalry." "The Great French Long-Distance Rides, 1903-05, and their Lessons." "Military Veterinary Review."

Belgium.—*Bulletin de la Presse et de la Bibliographie Militaires.* Brussels: 31st October, 1906.—"Subsistence Supply in the Field for Large Units" (*continued*). "The Russo-Japanese War" (*continued*). 15th November.—"Subsistence Supply in the Field for Large Units" (*continued*). "Regulation of the 19th July, 1906, on the Status of Non-commissioned Officers in Italy." "The Russo-Japanese War" (*continued*). 30th November.—Has not been received.

France.—*Le Spectateur Militaire.* Paris: 1st November, 1906.—"The Bellecourt Brigade of the Army of the Rhine" (*continued*). "German South-West Africa" (*continued*). "On Patrol Duty Across the Beauce" (*continued*). 15th November.—"The Bellecourt Brigade of the Army of the Rhine" (*continued*). "German South-West Africa" (*concluded*).

"Neutrality Incidents in the Russo-Japanese War" (*continued*). "The Neutrality of Belgium in 1906."

Revue du Service de l'Intendance Militaire. Paris: September, 1906. —"Beans and Prussic Acid" (*continued*). "Methods of Checking Army Accounts" (*continued*). "Wines of the Mascara District."

October and November, 1906.—Have not been received.

Revue du Cercle Militaire. Paris: 3rd November, 1906.—"Germany —A Criticism of the Grand Manœuvres of 1906" (*continued*). "Instruction of Reserve Officers." "Spanish Army—Scheme of Reorganisation." "The Battle of Wafangu" (*continued*). 10th November.—"Lines of Communication in Bosnia—Herzegovina and Dalmatia." "Admission of Candidates to the School of Saint Cyr in 1907." "Germany — A Criticism of the Grand Manœuvres of 1906" (*continued*). 17th November. —"A Regimental Lecture: The Weakly in the Cavalry." "Our Grand Manœuvres judged by an Englishman." "Lines of Communication in Bosnia—Herzegovina and Dalmatia" (*concluded*). "Germany — A Criticism of the Grand Manœuvres of 1906" (*concluded*). 24th November. —"Italian Conscription." "Preparation for the Higher War School." "A Regimental Lecture: 'The Weakly in the Cavalry'" (*concluded*).

Revue d'Histoire. Paris: October, 1906.—"The Campaign of 1800 with the Grisons Army." "The Campaign of 1805 in Germany" (*continued*). "The War of 1870-71: The Army of Châlons" (*continued*).

November, 1906.—"The Campaign of 1800 with the Grisons Army" (*continued*). "The Campaign of 1805 in Germany" (*continued*). "The War of 1870-71—The Army of Châlons" (*continued*).

Journal des Sciences Militaires. Paris: October, 1906.—"Criticism of the Campaign of 1815." "Napoleon Strategic Methods." "Colonel Roequancourt, Military Writer." "Experience of the Russo-Japanese War" (*continued*). "Infantry Competitive Manœuvres" (*continued*).

November, 1906.—Has not been received.

La Revue d'Infanterie. Paris: November, 1906.—"Africa and the Crimea, 1850-1856." "Critical Study of the English Regulations for the Three Arms" (*continued*). "Reflections on the War in Manchuria." "What we should know about the German Army."

Revue Militaire des Armées Etrangères. Paris: November, 1906.— "Reorganisation of the Berlin Military Technical Academy." "Changes introduced into the English Army in consequence of Recent Wars." "The Austrian Imperial Manœuvres in Silesia, 1906." "The *Rôle* of Fortresses in Modern War, according to German Conception."

Revue d'Artillerie. Paris: October, 1906.—"Notes on certain Properties of Aeroplanes." "Execution of Masked Fire." "Methods of Aiming."

November, 1906.—Has not been received.

Revue de Cavalerie. Paris: November, 1906.—Has not been received.

Revue du Genie Militaire. Paris: November, 1906. — "Dirigible Balloons" (*continued*). "Some Lessons to be drawn from the Siege of Port Arthur."

GERMANY.—*Militär-Wochenblatt.* Berlin: 1st November, 1906.—"A Hundred Years Ago" (*continued*). "Recruits' Evening Entertainment." "The New Cycling Regulations." 3rd November.—"Moltke's General

Staff Rides." "On the Military Situation in Russia." "Mounted Infantry." 6th November.—"Italian Opinion on the Italian Manœuvres." "Contribution to Methods of Bayonet Instruction." "On the New Pension Regulations for Russian Officers." 8th November.—"A Hundred Years Ago" (*continued*). "English Criticism of Manœuvres." 10th November.—"On the 100th Anniversary of the 4th Würtemberg Infantry Regiment." "Proof of the Estimate of Losses on the Memorials of the Battles of Jena and Auerstädt." "Situation of the Japanese Horse-Breeding." 13th November. — "Results of Imperial Military Legislation." "Medical Training of Officers." "On the Appearance of Disease of the Mind in the Russian Army during the Russo-Japanese War." 15th November.—"Covered or Exposed?" "The East Siberian and Siberian Troops of the Russian Army before and after the Japanese War." "Clothing of Officers in the Field." 17th November.—"The Battle Shooting of Machine Guns in Groups." "The Great Wireless Telegraph Station at Berlin." "The Vindication of the Nothard Rifle." 20th November.—"Intelligence from the Belgian Army." "The Russian Artillery." 22nd November.—"Supplement to the Navy List." "Redistribution of the Russian General Staff." "From the Chinese Army." 24th November.—"On the Battle of Tsushima." "Can the Draught Power of Artillery Horses be raised?" "The Use of Periodic Literature for Cavalry." 27th November.—"Admiral Fournier's Report on the French Naval Manœuvres for 1906." "The English Field Fortifications Regulations." 29th November.—"On the Battle of Waterloo." "Once more the Vindication of the Nothard Rifle." "Armament of the Prussian Infantry in 1806." "Battle Drill with Casualties" (*continued*).

Internationale Revue über die gesamten Armeen und Flotten. Dresden: November, 1906. — "Military and Naval Intelligence from Austria-Hungary, Belgium, France, Germany, Greece, Great Britain, Italy, Japan, Russia, Switzerland, Turkey, and United States." *Supplement 80.*—"Military Education and Training in the United States." *French Supplement 92.*—"Field Artillery *Matériel* at the Milan Exhibition." "The Siege of Port Arthur according to the German Grand General Staff." "With regard to the Inauguration of the Monument to Clausewitz." "Nauticus, 1906."

Jahrbücher für die Deutsche Armee und Marine. Berlin: November, 1906.—"The further Development of our Tactical Regulations." "Siege Warfare in Theory and in Practice" (*concluded*). "The Results of this Year's French Autumn Manœuvres." "Military Sociology." "The Cavalry Recruit Reserve." "The Taking Off of the Valise in Battle." "German and French Infantry Tactics."

Neue Militärische Blätter. Berlin: October, 1906. No. 17.—"On the Observance of Military Secrets in War." "A Letter from General Zerpizki, Commanding Xth Army Corps, to Adjutant-General Kuropatkin." "The Attack of the 2nd Squadron Hanovarian (Duke of Cambridge's) Dragoons at Langensalza, the 27th June, 1866." "A few Remarks on the Infantry Drill Regulations" (*concluded*). "Military Intelligence." No. 18.—"England's Power for the Defence of her Imperial Interests." "Painful Consequences of the War with Japan in the Russian Corps of Officers." "Hunting." "Military Intelligence."

November, 1906. No. 19.—"The New Field Fortification Regulations." "England's Powers for the Defence of her Imperial Interests" (*continued*). "A French Naval Constructor on the Lessons of the Battle of Tsushima." "Hunting" (*concluded*). "Military Intelligence." No. 20.—"On the

Anniversary of the Death of Duke Ferdinand of Brunswick, 10th November, 1806." "The Raising of the "Novik" and the "Mikasa."" "England's Powers for the Defence of her Imperial Interests" (*concluded*). "The New Field Fortification Regulations" (*concluded*). "Military Intelligence."

ITALY.—*Rivista di Artiglieria e Genio.* Rome: September, 1906.—"General Giacomo Longo." "Firing according to Previously Ascertained *Data* in Mountain Fortress Warfare." "Field Bridges." "Coast Artillery." "The Determination of Preliminary *Data* for Common Shell Fire from Siege Guns." "On the Damage caused to Buildings by the recent Eruption of Vesuvius."

October, 1906.—"About an Authentic Portrait of Pietro Micca and the Mines employed at the Siege of Turin." "On the Armament of Coast Fortresses." "Projectiles of Reduced Transverse Section." "Field Bridges" (*continued*). "The Army Exhibit at the Milan Exhibition of 1906." "The Artillery *Matériel* shown at the Milan Exhibition, 1906."

Rivista Militare Italiana. Rome: October, 1906.—"Fortification on the Battle-field." "On the Organisation and Work of First Line Medical Units in Modern Wars." "A Plea for New Musketry Regulations" (*continued*). "On the Selection of the Soldier at the Recruiting Commissions." "Statistical Notes" (*continued*). "Convents used as Barracks, and Churches serving as Stores."

PORTUGAL. — *Revista de Engenheria Militar.* Lisbon: September, 1906.—"Engineer Troops: Their Organisation and Instruction." "Projected Railway from Quilimane" (*continued*). "Metal Fascines for Instant Use." "The Principal Civil Engineering Works carried out in Portugal and the Colonies in 1905" (*concluded*).

Revista de Infanteria. Lisbon: November, 1906.—"Marches, Walking and Running." "National Target Practice." "Proposals of the Minister of War." "Machine Guns." "The Necessity of Codifying some of the Regulations." "General Direction of the Infantry Services."

Revista Militar. Lisbon: August, 1906.—"Infantry Tools" (*continued*). "The Choice of New Battle Units in the Navy" (*continued*). "Lessons of the Russo-Japanese War." "Progress of the National Mercantile Marine."

RUSSIA.—*Voïénnyï Sbórnik.* St. Petersburg: August, 1906.—"Description of the Defence of Sebastopol from the 5th to the 28th August, 1855." "General Michtchenko's May Raid." "The 1st East Siberian Pioneer Battalion during the Fights at Mukden from the 20th to the 26th February, 1905." "Company and Battalion Fighting and the Employment of Artillery in Action, according to the Experiences of the Russo-Japanese War." "The War Horse." "On the Insufficiency of the Effective of Officers of Fortress Artillery, and the Measures for Improving its Conditions." "Some Words on Coast Fortresses." "Extent and Population of Russia in 1905." "Recollections of Port Arthur." "Field Diary." "The Austro-Hungarian Army in 1906."

September, October, and November, 1906.—Have not been received.

SPAIN.—*Memorial de Ingenieros del Ejército.* Madrid: October, 1906.—"An Account of the Results obtained in the Observations of the Total Eclipse of the Sun, 30th August, 1905" (*continued*). "General Formulæ for the Calculation of Turbines" (*concluded*). "Field Tent for Surgical Operations in the Military Hospital at Legnono."

Revista Técnica de Infantería y Caballería. Madrid: 1st November, 1906.—"Preparation for Battle." "On Military Instruction." "Usefulness of Cavalry in Modern Armies" (*continued*). "The Island of Teneriffe" (*continued*). "The Practical Infantry Schools."

15th November, 1906.—"Three-Battalion Regiments." "On Military Instruction" (*continued*). "Usefulness of Cavalry in Modern Armies" (*continued*). "The Self-Education of the Officer and High Command." "The Island of Teneriffe" (*continued*).

Revista Científico-Militar y Biblioteca Militar. Barcelona: November, 1906.—"Discussion on the Creation of New Types of Quarters in France." "The Spirit of Napoleon's Cavalry." "Physical Exercises in the French Army." "The Training of the U.S. Troops."

SWITZERLAND.—*Revue Militaire Suisse.* Lausanne: November, 1906.—"Jena." "The Military Medical Service at the Milan Exhibition of 1906" (*concluded*). "The Attack at Langres."

UNITED STATES.—*Army and Navy Life.* New York: November, 1906.—"The Legal Status of Persons in the Military Service of the U.S." "King Edward's Highlanders." "A Forgotten War." "A Plea for American Orders of Chivalry." "The Training of Cadets for the United States Army." "In After Years." "Impressions of an International Match." "The Man Below the Bayonet." "A New Naval Tongue." "The Perversion of Titles." "Army and Navy Sports."

Journal of the Military Service Institution. Governor's Island, N.Y.H.: November-December, 1906.—"American Citizen *versus* American Soldier and Sailor." "Left of the Line at Wilson's Creek, 1861." "National Camp of Instruction at Fort Riley." "Mounted and Dismounted Action of Cavalry." "A Visit to some Foreign Armies." "Points of Interest to Riflemen." "Organisation of a Military Reserve." "The Trumpeter and Trumpet Calls." "March of the Sixth Battery" (*concluded*). "Letters from Europe." "A Long-Distance Ride." "Types and Traditions of the Old Army." "Comment and Criticism."

Journal of the United States Artillery. Fort Monroe, Va.: September-October, 1906.—"The German First-class Battle-ship "Deutschland." "Mortar Fire." "A Contribution to Interior Ballistics." "Pointing Apparatus for Artillery Commanders." "A Mine Prediction Board." "Shrapnel and Shields." "Professional Notes."

NOTICES OF BOOKS.

The Hearseys. By Colonel HUGH PEARSE, D.S.O. London: Blackwood and Sons. 1905.

The history of our Indian Empire is inseparably connected with the names of several families, whose members have served the "grim stepmother" for many generations, and among these Anglo-Indian families few can have rendered better and more faithful service than the Hearseys. The first of them who went to India appears to have been Andrew Hearsey, who—in the good easy fashion of the old days—secured an Indian cadetship at the age of thirteen, and having first seen active service when only sixteen, spent the remaining thirty years of his adventurous life in marching and fighting all over India—being engaged in Popham's extraordinary capture of Gwalior in 1780, at Porto Novo, and in the first attack on Seringapatam. Still more remarkable were the services of his kinsman, Hyder Hearsey, who was with Perron and Thomas, two of those hard bitten military adventurers of India, and who, later, took service with the English and was engaged in the Nepalese War, and in the second siege of Bhurtpore. Hyder Hearsey married a Princess of Cambay, and their son William entered the service of the King of Oudh, and was with Henry Lawrence in Lucknow. But of all the family the one who is, perhaps, the best known to fame, is that fine old soldier, General Sir John Hearsey, son of Andrew Hearsey, who was commanding at Barrackpore when Mungul Pandy fired the shot which set Northern India in a blaze at the beginning of the hot weather of 1857. When one recalls the resolute action of Sir John Hearsey, the disbanding of the 19th and 34th Native Infantry, one may wonder whether the mutiny of the Bengal Army would have reached the proportions it did, had a *man* like General Hearsey been in command at Meerut.

Colonel Pearse has well performed a task of some difficulty, and has managed to give us a very truthful presentment of the characters and services of the men of a family which has rendered India good and faithful service in times of much danger and of no little difficulty.

With the Abyssinians in Somaliland. By Major JENNINGS and Dr. ADDISON. London: Hodder and Stoughton, 1905.

The literature about our recent operations in Somaliland is yet very scanty, so that this handsome volume is particularly welcome. Colonel A. N. Rochfort, R.A., was associated on two occasions with the Abyssinians—during General Manning's operations, and again during the more extensive campaign undertaken by Lieut.-General Egerton. On this second occasion, Colonel Rochfort was provided with a small staff, and the Emperor Menelik appears to have especially asked for the services of two British medical officers. The two selected were Captain Dunn and Major Wikes Jennings, the latter being responsible for the material contained in this book, which was subsequently put together by Dr. Addison. The object of the co-operation of the Abyssinians was to demonstrate

towards Mudug, holding the Mullah in the Nogal Valley until General Egerton had completed his arrangements for the advance of the field force under his command. Some 4,000 men were therefore assembled at Babilli, about thirty-six miles to the south-west of Harrar, and it is the movements of this force—dependent wholly upon the water capacity of the wells along the route—that Major Jennings narrates. The resulting operations are well described, while the author has also collected a quantity of information regarding the folk-lore, characteristics, and customs of the Abyssinians and Somalis. Last, but not least, Major Jennings was happily able to get in a good deal of shooting, the details of which will be found to be of much interest. That the British officers with the Abyssinians were able to lead them as far as they did is, perhaps, not specially remarkable; but it says much for the influence of the Englishman over savage races, that, having led these fighting men into a wilderness hundreds of miles from any scene of action, Colonel Rochfort and his little band of white men were able, for reasons which probably none of the Abyssinians understood, to keep them there, is certainly meritorious though perhaps not by any means unusual.

The photographs with which this book is liberally illustrated are clear and interesting, and at the end will be found a good sketch map of the part of the country traversed by the author.

The 79th News, South African Record, 1900-02. Inverness, Northern Counties Printing Co.

This appears to be the War number of the Regimental Gazette, and is a little disjointed in its arrangements. But it records the services of the 1st Battalion Queen's Own Cameron Highlanders during the two-and-a-half years of its service in the Transvaal and Orange River Colonies. The battalion did not arrive in the country in time to participate in any of the big battles; but it performed very useful services in the engagements at Vet River and Zand River, Bethlehem, Wittebergen, and Ladybrand, in the Orange Free State, in those of Johannesberg, Pretoria, and Diamond Hill in the Transvaal, in the operations in the Eastern and Western Transvaal, and in those on the borders of Natal and Zululand. In all these operations their behaviour was what one would have expected of a regiment with a history like the Camerons.

Historical Record of the 3rd (King's Own) Hussars. By Major-General R. Blundell. London: Griffith & Sons.

The 3rd Hussars is one of the senior of the British Cavalry regiments, having originated in 1685. It fought at the Boyne, and at Aghrim, in 1690-91; was in the disastrous battle of Almanza, 1707; at Sheriffmuir; in the Highland Rising of 1715; at Dettingen and Fontenoy; at Culloden in the Highland Rising of 1745; in the Peninsula at Salamanca, Vittoria, and Toulouse; was distinguished in Afghanistan in 1842; and again in the Sutlej and Punjab in 1845-49; and in South Africa, 1901-02. It had a splendid reputation during the Sutlej Campaign, and after Moodkee obtained the soubriquet of "The Moodkee-Wallahs," by which it was known by the natives for many a year; but between 1849 and 1901, it had not the good fortune to see any prominent service. The present volume is founded on Cannon's history, published in 1847, which was brought down to 1856 by Captain Kauntze, and has been continued up to date with some care by Major-General Blundell. It is extremely well printed and got up, and the illustrations are excellent.

PRINCIPAL ADDITIONS TO LIBRARY, NOVEMBER, 1906.

Summary of the Art of War. By General Baron de Jomini. Translated from the French by Major G. F. Winship, A.A.G., and Lieutenant E. E. McLean, U.S.A. Crown 8vo. (G. P. Putnam & Co.) New York, 1854.

Memoirs of C. M. Talleyrand de Perigord. By the Author of *The Revolutionary Plutarch.* 2 Vols. 8vo. (H. S. Nichols.) London, 1895.

Essai sur l'Emploi tactique de la Fortification de Campagne. By Lieut.-Colonel L. Piarron de Mondesir. 8vo. 2s. 6d. (Berger-Levrault et Cie.) Paris, 1906.

Manual of Map Reading and Field Sketching. Official. Crown 8vo. 1s. 3d. (Presented.) (Harrison & Sons.) London, 1906.

Schwebende Feldartillerie Fragen. By General E. von Hoffbauer. 8vo. 2s. 8d. (E. S. Mittler und Sohn.) Berlin, 1904.

Report on American Manuscripts in the Royal Institution of Great Britain. (Historical Manuscripts Commission.) 2 Vols. 8vo. 4s. 9d. (Mackie & Co., Ltd.) London, 1904-06.

Tamil Grammar Self-Taught. By Don M. de Zilva Wickermasinghe. Crown 8vo. 5s. (Presented.) (E. Marlborough & Co.) London, 1906.

Kampf um vorbereitete Stellungen. By Captain K. Bernatsky. 8vo. 1s. 8d. (R. Eisenschmidt.) Berlin, 1904.

Cavalry on Service. By General von Pelet-Narbonne. Translated from the German by Major D'A. Legard. 8vo. 7s. 6d. (Presented.) (Hugh Rees, Ltd.) London, 1906.

Tibet the Mysterious. (Exploration Series.) By Sir Thomas Holdich, K.C.M.G., K.C.I.E., C.B. 8vo. 7s. 6d. (Alston Rivers, Ltd.) London, 1906.

The Defence of the Realme, 1596. By Sir Henry Knyvett. Crown 8vo. (Presented.) (Printed from a MS. in the Chatham Library by the Clarendon Press.) Oxford, 1906.

Memoires Relating to the State of the Royal Navy of England for Ten Years, Determin'd December, 1688. By S. Pepys. Crown 8vo. (Presented.) (Reprinted by the Clarendon Press.) Oxford, 1906.

Links in my Life on Land and Sea. By Commander J. W. Gambier, R.N. 8vo. 15s. (T. Fisher Unwin.) London, 1906.

Psychologie des Foules. By G. Le Bon. Crown 8vo. 2s. (Félix Alcan.) Paris, 1907.

Esprit de la Guerre Moderne—La Manœuvre d'Jéna. By Général H. Bonnal. 8vo. 8s. (R. Chapelot et Cie.) Paris, 1904.

Red Rubber. By E. D. Morel. Crown 8vo. 3s. 6d. (T. Fisher Unwin.) London, 1906.

The Revolutionary and Napoleonic Era, 1789-1815. By J. Holland Rose. Crown 8vo. 4s. 6d. (University Press.) Cambridge, 1904.

Memoirs of the Prince de Talleyrand. Edited by the Duc de Broglie, and translated by R. L. de Beaufort and Mrs. Angus Hall. 5 Vols. 8vo. (Griffith, Farran, Okeden, and Welsh.) London, 1891.

English Men of Action Series :—

Colin Campbell, Lord Clyde. By Archibald Forbes. Crown 8vo. 2s. 6d. (Macmillan & Co.) London, 1895.

Dundonald. By Hon. J. W. Fortescue. 8vo. 2s. 6d. (Macmillan & Co.) London, 1895.

Wolfe. By A. G. Bradley. Crown 8vo. 2s. 6d. (Macmillan & Co.) London, 1904.

Sir Walter Raleigh. By Sir Rennell Rodd. Crown 8vo. 2s. 6d. (Macmillan & Co.) London, 1905.

H.R.H. George Duke of Cambridge—A Memoir. By Edgar Sheppard. 2 Vols. 8vo. 24s. (Longmans, Green & Co.) London, 1906.

The Lower Niger and its Tribes. By Major A. G. Leonard. 8vo. 12s. 6d. (Macmillan & Co.) London, 1906.

Dampier's Voyages. By Captain William Dampier. Edited by John Masefield. 2 Vols. 8vo. 25s. (E. Grant Richards.) London, 1906.

Correspondence of William Pitt, when Secretary of State, with Colonial Governors and Military and Naval Commissioners in America. Edited by Gertrude S. Kimball. 2 Vols. 8vo. (Macmillan & Co., Ltd.) London, 1906.

The Evolution of Culture, and other Essays. By Lieut.-General A. Lane Fox Pitt-Rivers. Edited by J. L. Myers. 8vo. (Presented.) (Clarendon Press.) Oxford, 1906.

Voyages and Travels. By Captain Basil Hall. R.N. 8vo. 4s. (T. Nelson & Sons.) London, 1895.

Memoirs of Prince Chlodwig of Hohenlohe-Schillingsfuerst. Edited by Friedrich Curtius for Prince Alexander of Hohenlohe-Schillingsfuerst, and translated from the first German Edition and supervised by G. W. Chrystal. 2 Vols. 8vo. 24s. (William Heinemann.) London, 1906.